THE RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
INCORPORATING
The Railway Engineer · TRANSPORT · The Railway News
The Railway Times · Herapath's Railway Journal ESTABLISHED 1835 · THE RAILWAY RECORD.
RAILWAYS ILLUSTRATED · THE RAILWAY OFFICIAL GAZETTE

PUBLISHED EVERY FRIDAY
AT
33, TOTHILL STREET, WESTMINSTER, LONDON, S.W.1

Telegraphic Address: "TRAZETTE, PARL., LONDON"
Telephone No.: WHITEHALL 9233 (6 lines)

Annual subscription payable in advance and postage free
British Isles and Abroad.....£2 5s. 0d.
Single Copies.....One Shilling
Registered at the General Post Office, London, as a Newspaper

VOL. 68. No. 4 FRIDAY, JANUARY 28, 1938

CONTENTS

The Interstate Commerce Commission

THE U.S.A. Interstate Commerce Commission celebrated on April 1, 1937, the fiftieth anniversary of its constitution. The Act to Regulate Commerce, by which the Commission was created, was approved on February 4, 1887, but the first meeting for the transaction of business was held on April 1, 1887. In commemoration of the anniversary a convention was held at Washington D.C. and a history was compiled of the activities of the commission during its fifty years of existence. The fifty-first annual report of the commission, now issued, is published at a moment when there is something like a crisis hanging over the American railways. Apart from this the report is an extraordinarily complete and concise record of the state of the railways and other forms of transport and their operation during the period from November 1, 1936, to October 31, 1937. Primarily, however, it is railway operation and finance that is dealt with, and summaries are given of the results of operation of the whole of the system, in aggregate, backed by statistics in detail. A chapter also relates to civil air transport and there is a section referring to motor carriers. No statistics are given of road transport, as the motor undertakings have not yet been required to file annual reports of their earnings, the formulation of an accounting classification for them being still in progress. The same applies to air transport undertakings. Outside the statistical portion of the report the most interesting features are those relating to rate increases and also the sections describing legislative measures and legal decisions. As befits the very wide reach of its functions and the importance of the enterprises under its supervision, this report of the Interstate Commission is surely one of the most complete records of transportation statistics extant, and, moreover, with an excellent index, it is a model of conciseness.

* * * *

An Early Long-Distance Excursion

Reference to the long non-stop runs provided by the L.N.E.R. for Christmas holiday traffic recalls what was perhaps the first long non-stop express provided for holiday traffic—in this case an excursion train, and over a very difficult cross-country route. On the Thursday before Easter, 1905, the Great Central Railway first ran a day train from Manchester (London Road) to Plymouth, *via* Banbury and the Great Western's Badminton line, avoiding Bristol, which had a non-stop run of 173 miles from Banbury to Exeter in 3 hr. 38 min., and was booked over the 300 miles from Sheffield to Newton Abbot, with six intermediate stops, in 7 hr. 2 min., as compared with the time of the L.M.S.R. Devonian today, on its 264-mile journey between the same points, of 6 hr. 35 min. The train was formed of Great Central corridor stock with buffet, carried 157 passengers on leaving Banbury, and was worked (from Leicester to Plymouth) by a Robinson Atlantic, No. 265. The greatest care was taken to give a punctual and comfortable journey; so much so that at Didcot (Foxhall) the Great Western's 12.7 non-stop from Exeter to Paddington was held to give the excursion preference over the junction, and the train passed over the relief lines outside Taunton 2½ min. early and was only 8 min. late at Newton, in spite of the heavy holiday traffic and the innumerable junctions to be crossed.

* * * *

The Week's Traffics

Coal contributes £94,000, merchandise £46,000, and passenger train traffics £62,000 to the combined increase of £202,000 in receipts shown by the four main-line railways for the past week. This added to the previous two weeks' combined increase of £190,000 makes a total increase of £392,000 for the year to date. Total takings for the past week were L.M.S.R. £1,191,000, L.N.E.R. £895,000, G.W.R. £487,000, and Southern Railway £359,000, representing increases over the corresponding period of last year of £85,000, £63,000, £35,000, and £19,000, respectively.

	3rd Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec	
	£	£	£	£	£	%
L.M.S.R. ..	+ 26,000	+ 18,000	+ 41,000	+ 85,000	+ 184,000	+ 5·54
L.N.E.R. ..	+ 16,000	+ 10,000	+ 37,000	+ 63,000	+ 114,000	+ 4·66
G.W.R. ..	+ 7,000	+ 16,000	+ 12,000	+ 35,000	+ 60,000	+ 4·31
S.R. ..	+ 13,000	+ 2,000	+ 4,000	+ 19,000	+ 34,000	+ 3·42

Great Northern (I.) traffics for the past week, totalling £15,950 show an increase of £700 and Great Southern totalling £64,828 a decrease of £3,158. Mersey Railway receipts total £4,421, an increase of £302, and Liverpool Overhead £1,411, an increase of £236. London Transport receipts amounted to £560,100, an increase of £10,900.

* * * *

Bengal & North Western Railway

The report of the Bengal & North Western Railway Company for the year ended September 30, 1937, shows that gross earnings on the 1,305 miles of metre gauge line belonging to the company and 799 miles of the Tirhut State Railway worked by the company, were Rs. 25,02,047 over the previous period. But working expenses had also increased by Rs. 12,47,980, net earnings being Rs. 12,54,067 higher. The number of passengers increased by 2,079,289, mainly in third class, and the principal increases in goods traffic were in sugar and rice. The

increase in expenditure was chiefly on locomotive account but track maintenance was also up by the extra cost of relaying with heavier rails.

	1936–37	1935–36
Mean mileage	2,109	2,110
Passengers	33,008,248	30,928,959
General merchandise, tons	5,044,450	5,008,123
Operating ratio, per cent.	44·04	43·65
	Rs.	Rs.
Coaching receipts	1,55,46,672	1,45,58,792
Goods traffic receipts	2,28,16,879	2,15,79,700
Total earnings	3,95,21,209	3,70,19,162
Working expenses	1,74,06,736	1,61,58,756
Net earnings	2,21,14,473	2,08,60,406

The company's share of the net earnings was Rs. 1,26,62,140, realising with gain on remittances £955,018, as compared with Rs. 1,20,02,508 and £905,453 respectively for 1935-36. Stockholders receive a total distribution of 18 per cent., the same as in the previous year.

* * * *

Overseas Railway Traffics

Decreases totalling £27,295 in the past two weeks have put Buenos Ayres & Pacific aggregate receipts back by £24,481 compared with the position a year ago, and both the B.A. Western and the Central Argentine have shown decreases throughout the fortnight. The B.A. Great Southern, however, made a recovery in the 29th week, the receipts for which were £1,985 higher than in the corresponding period of 1937. Bombay, Baroda & Central India receipts have fallen by £95,925 in the period under review, although the 43rd week approached nearer by £1,425 to the 1937 figure.

	No. of Week	Weekly Traffics	Inc. or Decrease	Aggregate Traffic	Inc. or Decrease
		£	£	£	£
Buenos Ayres & Pacific	30th	99,442	– 10,856	2,416,008	– 24,481
Buenos Ayres Great Southern	30th	216,191	– 12,903	4,012,034	+ 202,525
Buenos Ayres Western	30th	50,816	– 14,765	1,366,378	+ 8,173
Central Argentine	30th	120,751	– 84,857	3,787,309	– 527,858
Canadian Pacific	3rd	474,800	+ 600	1,404,600	+ 16,200
Bombay, Baroda & Central India	43rd	262,500	– 47,250	7,044,000	+ 144,075

The C.P.R. has earned £16,200 more in the first three weeks of 1938 than during the corresponding period a year ago.

* * * *

Tasmanian Government Railways

An increase of £30,000 in the earnings of the Tasmanian Government Railways in the year ended June 30, 1937, according to the report received from Mr. F. P. St. Hill, Commissioner for Railways, was an indication of the increasing prosperity of the State. There was however an even greater increase, amounting to £60,000, in the working expenses, due principally to the introduction of the 44-hour week, the special effort made during the year to bring the rolling stock up to a reasonable state of efficiency, and the running of 168,000 additional train-miles to deal with extra traffic requirements. The chief operating statistics were as follow:—

	1936–37	1935–36
Average mileage open	651	645
Passengers	2,331,516	2,321,823
Goods and minerals, tons	799,021	745,643
Train miles	1,586,216	1,418,159
Operating ratio, per cent.	130·46	125·77
	£	£
Passenger receipts	120,676	120,328
Goods and mineral receipts	302,213	274,451
Total earnings	478,666	448,614
Working expenses	530,461	470,218
Loss on working (excluding £94,000 for depreciation)	51,795	21,604

Provision of £94,000 was again made for depreciation, in addition to ordinary working expenses. During the year the Government took steps to reduce the railway capital account by £4,738,000, the interest for the year being lowered to £83,995, as against £224,504 in the previous report. On the retirement of the Chief Engineer it was decided to amalgamate the rolling stock, and way and works branches. The train control installation is being extended throughout the system. Five new Sentinel-Cammell steam railcars, fitted for burning oil fuel, were put into service, and two large Drewry units were re-engined with diesel motors. The deviations at Andover and the "Backbone" were completed and opened.

* * * *

Canadian Railways Progress

Had not the crop failure in Western Canada reduced revenue from grain haulage to an almost negligible amount during the last two months of 1937, there would have been little cause for complaint in the year's working results of the Canadian railways. Up to December 1, the Canadian National Railways gross receipts were about 7½ per cent. above those for the corresponding period of 1936 and the Canadian Pacific Railway gross receipts averaged a 5 per cent. advance. As a great many adjustments are made in December it is difficult to estimate the financial showing for the year of these two principal railways but, according to our American contemporary, the *Railway Age*, it is believed probable that the C.P.R. will have slightly more than sufficient from its net receipts to cover its $25,000,000 of interest charges, while the C.N.R. will have about $8,000,000 net revenue to apply to the payment of the $48,000,000 of interest due to the public. Continued efforts were made during the year to increase traffics and to effect savings in operation. At least two of the major capital works of the C.N.R. which have remained "expensively incomplete" are likely to be resumed during 1938. One is the Vancouver hotel, the cost of which to date, including interest charges, is estimated at about $20,000,000. The other is the unused site intended for an elaborate terminal station in the centre of Montreal, and the viaduct, constructed in connection with the scheme, across the lower part of the city linking the proposed terminus with the Victoria Bridge over the River St. Lawrence. This project which so far has cost $16,509,000 will probably cost another $7,000,000 to complete.

* * * *

Argentine Railway Results, 1927-36

The disappointing rate of remuneration obtained in late years by the very large amount of British capital invested in South America and particularly in the Argentine Republic, has given rise to well justified criticism. It has been said that the wave of prosperity now so evident in Argentina, and amounting almost to a boom, has not been shared by the railways operating in that country, and the services, past and present, rendered by these undertakings (and perhaps it is correct to say especially by the British-owned railways) are not fully recognised. These disappointing features have been voiced on more than one occasion by those responsible for the direction and administration of the railways, and they are now confirmed from an official source. The *Instituto de Estudios Economicos del Transporte*, of Buenos Aires, has issued a summary of railway working statistics, in which the results of operating the Argentine railways are given in some detail for the ten years 1927-1936, together with the index numbers relating the figures in each case to the year 1927 as 100. We publish in our Overseas news columns an abstract of the figures, which, apart from other interesting features, clearly show that the railways, burdened with an ever increasing ratio of working expenses, have not shared equitably in the prosperity which they have in such great measure helped to create.

Railroads at the World's Fair, New York

For the first time the railways of the U.S.A. are co-operating in setting up a joint exhibit in a great national exhibition. The exhibit, which will depict progress in rail transport, will be presented at the New York World's Fair in 1939 under the sponsorship of twenty-six of the Eastern railroads, as represented in the Eastern Presidents' Conference. Some sixteen acres are to be devoted to the exhibit, including a large open-air stage show under the direction of Mr. Edward Hungerford, who was responsible for the " Fair of the Iron Horse " in Baltimore in 1927, and for the " Wings of a Century " at the Chicago World's Fair of 1933-1934. Apart from the pageant of transportation, which is to be known as Railroads on Parade, indoor exhibits are being arranged in an S-shaped building some 1,400 ft. long and flanked at the east end by a dome 180 ft. in diameter. From preliminary details which we have seen, it appears that the arrangements are being characterised by simplicity and dignity, while the open-air show under the direction of Mr. Hungerford is sure to be of a size and impressiveness which will fully justify the provision of a grandstand with a capacity for seating 4,000.

* * * *

The Fastest Train in the World

By reason of certain rearrangements of train times in the United States, the blue riband of scheduled railway speed has now passed back to Germany. It is held by the diesel-electric Fliegende Kölner, which is booked from Berlin (Zoo) to Hanover, 157·8 miles, in 115 min., at 82·3 m.p.h., and from there to Hamm, 109·6 miles, in 80 min., at 82·2 m.p.h. Hard on the heels of this flyer comes the eastbound City of Denver of the Union Pacific, U.S.A., booked over the 62·4 miles from Grand Island to Columbus in 46 min., at 81·4 m.p.h., and from North Platte to Kearney, 95·0 miles, in 71 min., at 80·3 m.p.h. That this is no mere flash in the pan is shown by the fact that these two runs form part of a stretch of 431 miles from La Salle to Columbus which is covered in its entirety at an average of 76·3 m.p.h., including five intermediate stops, and with a twelve-car train. With steam propulsion Germany also leads, the 74·2 m.p.h. run of its evening Berlin—Hamburg non-stop express (178·1 miles in 144 min.) taking premier place, followed by the Hiawatha of the Chicago, Milwaukee, St. Paul & Pacific, which covers the 43·1 miles from New Lisbon to Portage in 35 min., at 73·9 m.p.h. start-to-stop. By the excision of stops at Gary and Plymouth, the famous Detroit Arrow of the Pennsylvania now has the slightly slower average of 73·6 m.p.h. over the 141·0 miles between Englewood and Fort Wayne in each direction, and so takes second place. The fastest scheduled run in Great Britain—the 71·9 m.p.h. from King's Cross to York, of the L.N.E.R. *Coronation* —takes seventh place among the world's fastest steam-hauled railway runs.

* * * *

Signalling in New Zealand

The application of modern signalling apparatus to the special conditions obtaining in one of the Dominions was dealt with in the paper by Mr. G. W. Wyles on signalling on the New Zealand Railways, read in his absence by his son, Mr. Ivan Wyles, before the Institution of Railway Signal Engineers on January 26 and reproduced in abridged form on page 169. The large amount of single line and certain other features of the railway system bear a strong resemblance to American conditions, and it is not surprising therefore that the absolute-permissive principle of automatic single line signalling should have found application and given very satisfactory results. At first, as was only natural, British operating methods were adopted and the electric tablet system was used, from which has sprung the present practice of having the starting signals at loop stations normally at " danger " and approach cleared. The use of the pilot key for emergencies is also traceable to the earlier use of token working. The ready availability of electric power has no doubt much facilitated the introduction of the latest types of equipment. Although there is as yet no call for the large installations of power interlocking to be found in other countries, such examples as there are in New Zealand incorporate the latest technical progress, such as relay interlocking and automatic point operation. As we should have expected, it has been decided to adopt centralised traffic control for two sections of line, and we concur with Mr. Wyles in thinking there should be considerable scope for it in the country.

* * * *

Welded Locomotive Cylinders in France

The former Paris-Orleans-Midi Railway had in service a number of 2-8-2 type freight engines of American design and construction, which were built during the period of the great war. In course of time defects have developed in the cylinders, the majority of which were incapable of repair by oxy-acetylene or electric welding, thereby involving premature replacement. It was therefore decided to test the practicability of building new cylinders by welding together plate components, and the work was entrusted to the Périgueux workshops. The methods adopted in the building up of the cylinders and steam-chests, together with the supporting brackets and smoke-box saddle, are illustrated on pages 178-182 of this issue in the article by Monsieur E. Monier, Chef Divisionnaire, Périgueux. When the first locomotive had been completed, trials were carried out, including one to test the stability and smooth running of the cylinders under load. Five locomotives coupled together were used, and the engine with the welded cylinders was purposely allowed to slip its wheels when starting with the heavy load. This trial was successfully passed, and the engine has since been in regular service from the Angoulême depôt without any trouble arising from the cylinders. The author of the article states that this is the first set of locomotive cylinders built by welding in France.

* * * *

Every Puzzle Points a Moral

The G.W.R. Goods Department has carried its campaign against breakages a step further than was possible with the " claims prevention " posters reproduced in our pages on numerous occasions. Whereas the posters addressed their message to the men as they worked, the latest device catches them in their moments of receptive leisure at home. In short, members of the staff engaged in the actual handling of goods are being given jig-saw puzzles, which they are invited to solve and contemplate at home. Completed, the puzzle shows two children gazing with despair at a handsome model G.W.R. locomotive just delivered by rail, but suffering from a severe dent of the smokebox, and dislocation of the buffer beam and bogie. At the foot is the pertinent query, " Wouldn't *you* be annoyed if your goods arrived damaged? " There is a touch of true melodrama in the title—" Lost in Transit " or " Damaged through Thoughtlessness." We visualise the grand *dénouement* to the tale of the careless workman. He gives the puzzle to his babes to make, and, summoned by a childish treble to view their handiwork, reveals by his guilty start and ashen countenance that their own father is a wrecker.

Palestine Railways

THE Palestine Railways Administration operates 1,003 route-kilometres of line, of which 536 km. are of standard gauge, and 467 of 105-cm. gauge. The Rafa—Haifa, and Jaffa—Jerusalem lines, 333 km. of standard gauge, are in Palestine proper and are owned by the Government of Palestine. The remaining 203 km. of standard gauge constitute the Kantara (Suez Canal)—Rafa line, which is in Sinai and is the property of the British Government. The narrow-gauge lines are those making up the 467 km. of the Hedjaz Railway, of which 144 km. are in Palestine and 323 km. in Trans-Jordan. The annual report of the General Manager, Mr. C. R. Webb, for the year 1936-37, received from the Crown Agents for the Colonies,* refers to the political disturbances which were unfortunately a prominent feature of the year and which have rendered nugatory the comparison of results with previous periods. The disturbances broke out less than three weeks after the beginning of the financial year and the economic effects continued to be felt throughout the year. It is impossible to say, the report continues, how much traffic the railway lost or gained. A large amount of usual traffic, passenger and goods, did not move at all, but on the other hand much traffic was transferred to the railways and there was a large increase in military transports, while the railway also benefited from the cessation of work at Jaffa port and the diversion of cargoes to Haifa. The railway was operated under great difficulties, being subject to constant attacks. Sabotage was frequent, night running having to be suspended. The General Manager records with great satisfaction the loyal and devoted attitude of the staff. Working results of the three main sections are compared in the following table:—

	1936-37 £P	1935-36 £P	Inc. or dec. £P
Palestine Railway			
Gross receipts	716,754	588,816	+127,938
Working expenditure ..	456,459	421,822	+ 34,637
Net receipts	260,295	166,994	+ 93,301
Kantara-Rafa Railway			
Gross receipts	180,945	119,052	+ 61,893
Working expenditure ..	144,601	110,551	+ 34,050
Net receipts	36,344	8,501	+ 27,843
Hedjaz Railway			
Gross receipts	101,400	102,751	— 1,351
Working expenditure ..	113,143	108,252	+ 4,891
Net receipts	Dr. 11,743	Dr. 5,501	+ 6,242

The increase of 21·7 per cent. in the receipts of the Palestine Railway was due to the circumstances already referred to, namely, the heavy military traffic and the diversion of cargoes from Jaffa to Haifa; and the revenue in 1936-37 was the largest since the railway was taken over by the civil administration in 1920. The increase in operating expenses was due to the cost of protection of the railway, to damage and sabotage, and to increased contributions to the renewals fund. Although the renewals fund scheme proposed by Messrs. Price, Waterhouse & Company two years ago (as a result of their investigation of the railway) has not yet been fully constituted, a proper renewals fund, based on the value of wasting assets is, in effect, already in operation. The railway is debited with a contribution to the fund, and this contribution is not related to the cost of renewals carried out during the year. The revenue of the railway exceeded ordinary working expenditure, including contributions to renewals fund (and including also in this instance emergency expenditure) by £P.260,295, but after taking into account the expenditure on extraordinary works, amounting to £P.152,992, and £P.157,140 in respect of debt charges and sinking fund, there was a deficit of £P.49,837, as compared with £P.114,112 in the previous year. Two new tank shunting engines, 8 coaching vehicles, and 100 goods vehicles were acquired for the Palestine Railway, and for the Hedjaz Railway various rebuilds and conversions of rolling stock were carried out. In the mechanical as well as in the engineering branches work on maintenance was delayed by the repairs necessitated by acts of sabotage, and also by the number of men withdrawn from their ordinary work for patrol and supervisory duties. Extensive planting with desert shrubs was carried out where the line suffers from dune movement, and 80,000 trees and shrubs were grown at the railway nursery at Lydda during the year.

* Obtainable from the Crown Agents for the Colonies, 4, Millbank, S.W.1. Price 3s.

* * * *

Rail Conveyance of Pedal Cycles

ONE of the most surprising features of road traffic in Great Britain is the high and steadily growing number of pedal cyclists, despite the increasing popularity of the motorcar. It is estimated that the number of cycles in use in this country has risen from six to ten millions during the last eight years. The annual production of British cycles for home and export exceeds two millions, and the British railways have been closely associated with the development of this important branch of industry for many years. Many machines are despatched singly by the manufacturers to individual consignees, in which case the cycles are sent loose in the guards' vans of passenger trains. More still, however, are packed in crates which hold from two to six machines, and sent by freight train. Apart from this retail trade, special attention has been given by the railways to the conveyance of bulk consignments of cycles travelling from the manufacturers to local distributing agents, and the present arrangements have been evolved to meet the universal practice in the home trade of sending cycles fully assembled with a minimum or complete absence of packing. Large covered containers were originally used for this purpose, but it soon became evident that satisfactory loading could be secured only by the construction of a container in which machines could be loaded transversely in two tiers, without any packing. Accordingly containers designed to carry seventy cycles were introduced, with very satisfactory results.

Railway practice is not static, however, and during last year numbers of containers have been constructed to an improved design, capable of carrying 76 cycles. These have removable internal fittings consisting of a staging in which two tiers of cycles can be loaded, arranged so that a 2-ft. 6-in. gangway is left in the centre of the container along which the loader is able to place the cycles progressively towards the exit. Racking and portable felt-covered laths are provided to secure the cycles safely in position and protect them from damage. Cycles carried in these containers, although technically not protected by packing, are conveyed at full company's risk. The extent to which these facilities have met the requirements of the trade can be realised from the fact that one company alone conveyed over 2,400 container loads, representing over 170,000 cycles, during last year. Incidentally, the interior fittings of these cycle containers have been made readily removable, to provide for the conveyance of household removals or similar purposes when the cycle trade is slack. A further useful facility provided by the railway companies in connection with the conveyance of cycles is the availability of storage accommodation at the main railway depots. The advantages of railhead storage are appreciated by manufacturers who carry large stocks of machines in the principal towns to meet demands arising over a wide area. By means of these railway services, stocks

of cycles can be stored at central points at very low rentals, and expeditious distribution arranged to meet requirements without incurring the expense of separate establishments.

* * * *

The Mexican National Railways

THE mileage of the system worked by the National Railways Company of Mexico, according to the annual report for 1936, is 7,107, of which the principal lines are the National, with 1,492 miles; the Central, with 3,590 miles, and the International, with 1,155 miles. Gross earnings, at $125,957,135 were 9 per cent. higher than in 1934, and constituted a record, the increase being made up of an all-round improvement under all heads of traffic. Passengers were 11·14 per cent. more in number, while freight traffic was up 7·3 per cent. in tonnage and 8.46 per cent. in receipts. Special efforts had been made to regain passenger traffic diverted to the roads, fifty additional carriages having been acquired and special reduced tariffs having been introduced on certain competitive sections. Tourist traffic, although not so favourable as in the previous year, continued to produce good earnings, and it is considered that this class of business, consisting mainly of tourists from the U.S.A., is now a permanent feature, due no doubt in great measure to the publicity campaign initiated a year or two ago. Goods traffic constituted a record for tonnage, the 8,963,598 tons of 1936 being greater even than the figure for the record year, 1929. Among the other forms of publicity recently undertaken in the interests of traffic, a *Commercial Bulletin* has been started, the publication of which, with fresh information as to markets, prices, &c., is hoped to assist in bringing the producer into contact with the consumer and so help trade and the railways.

On the expenditure side the heavier traffic, and consequent increase in train mileage, account in part for the greater outlay, as well as a prudent addition to the maintenance costs for the upkeep of rolling stock and fixed plant. The most important rise in working expenses, however, is under the head of wages. The Presidential decree of October 25, 1935, fixed minimum rates of pay, with payment for the seventh day, and the Federal Law of February 20, 1936, brought piece work and mileage rates under the Decree. On June 1 an increase of 8 per cent. was conceded to all office workers, and last, on September 1, the new contractual obligations conceded a paid vacation, to all grades, of fifteen days annually. Thus it is that while costs of materials show an increase over 1935 of 8·19 per cent. (including a rise in the average price of coal from $7 to $8·50 a ton), the total wages bill is up by no less than 23·59 per cent. Thus it is also that the total increase of 17·18 per cent. in working expenses is disproportionate to the increase of 9 per cent. in gross earnings. A diagram is given in the report showing the proportions of the different heads of working expenditure, in relation to the receipts, and it is graphically shown that wages, which accounted for 47·85 per cent. of the total earnings in 1935, absorbed in 1937 no less than 54·24 per cent. The results of working compared as follow:—

	1936	1935
Number of passengers	14,429,727	12,647,773
Public goods, tons	8,963,598	8,353,887
Average haul, km.	433·6	434·2
Average receipt, goods, centavos	2,272	2,245
Train-kilometres	26,059,985	—
	$	$
Passenger receipts	24,750,666.41	22,270,145.44
Public goods receipts	88,319,535.64	81,428,520.52
Express receipts	10,532,233.67	9,868,129.67
Gross earnings	125,957,135.50	115,510,837.92
Working expenses	104,524,367.72	89,199,064.61
Operating ratio	82·98	77·22

Under the head of betterments the management was authorised to acquire eight narrow gauge locomotives, at an estimated cost of $960,000. Other improvements authorised in 1936 were the provisional adaptation of Buenavista station to take the service of Colonia station, at an estimated cost of $572,500, and the installation of electric plant in the workshops at Aguas Calientes, involving an outlay of $363,000. Financial charges amounted to $22,058,732·06, and as net earnings were $17,285,514·46, the result was a deficit of $4,830,800·19. The service of the bonded debt of the company remained in suspense. The accumulated deficit brought forward from 1934 in the balance sheet was $401,442,850·07, to which must be added the shortage of 1936, subject, however, to a special credit due by the cancellation, ordered by the auditors, of a capital amortisation fund of $34,341,507·91, bringing the accumulated deficit in the balance sheet down to $384,994,746·36.

* * * *

Lightweight Trains

AN indication of the growing popularity of the lightweight train is the building of 20 two-coach units* for the French State Railways electrified services between Paris and Le Mans. Each car is fabricated by welding into virtually a one-piece unit composed of thin-gauge stainless steel so that the entire body structure performs load-carrying functions. Each of the two-car articulated units is approximately 130 ft. long and weighs complete only 65 tons. There is a driving compartment at each end, and current at 1,500 volts d.c., supplied by an overhead conductor, furnishes the power for the six electric motors of each unit. The trains have a maximum speed of 93 m.p.h. Seats are provided for 130 passengers in each train with standing room for 100 more. All doors, as well as the folding steps, are air-operated. In the construction of short lightweight trains there has been a continual battle between aluminium alloys and stainless steel. In the case of one highly successful three-coach unit on the Union Pacific Railroad of America, it was decided to use aluminium alloys for the entire coach structure, except the bolsters, articulation castings, and bogie frames, for which purpose a special alloy cast steel was used, having high tensile strength, high yield point, and great ductility. The net result is an estimated weight of 160,000 lb. for the three-coach train. A number of factors led to the adoption for this particular development of the aluminium alloys as against special alloy steels, but it should not be inferred that it is believed that aluminium alloys will be the one material suitable for such construction.

The development of aluminium alloys has been the object of some very progressive research work as applied to new methods of coach construction, the most interesting being the use of extruded metal shapes to take the place of the ordinary rolled shapes and pressings. These shapes are produced by merely forcing the hot metal through a die forming the cylinder head of the press. The producers of aluminium have co-operated with the coach builders and have been able to produce all of the desired shapes as outlined by the coach designer with a relatively small outlay for dies, and such shapes are so accurate in dimensions that the designer is able to interlock various extruded-metal sections or shapes to produce coaches of a minimum weight, maximum strength, and minimum deflection with simple shop fabrication. Aluminium plates can also be readily formed for the curved surfaces used in connection with streamlining. Aluminium can be readily riveted and spot-welded without injury to

* They were fully described in our Electric Traction Supplement of August 20 last, pages 342-340.

the material. All these factors contributed to the selection of aluminium in this case. It is believed that a great deal of development work will be done in connection with the use of high alloy steels, with the result that there will be strong competition between different materials in connection with producing the eventual lightweight passenger-carrying equipment.

This train and others running or being built in many parts of the world indicate the tendency towards the conception of a train as a unit rather than as an aggregation of engine and coaches, and the redesign of this unit to serve a particular purpose are very much to the fore in railway practice. The railway coach, from an engineering point of view, has most nearly resembled a covered bridge between its two trucks, the essential difference being that the coach is carried on what is virtually a two-point suspension. Although the coach body in the past has contributed to strength, the new trend is towards a better and better utilisation of the whole fabric of the coach for purposes of structural strength. The side walls are being developed into trusses, and even the roof takes part in carrying the load. By utilising this method of design and discarding unnecessary material which does not contribute to the strength of the entire unit, it has been possible to effect substantial savings of weight throughout the coach structure. Carrying this trend to its ultimate conclusion, the coach becomes a tube of trusses, and the sheathing applied to this tube can be made as light as desired. Although this phase of coach and train design has received special prominence recently, it has been developing in a less pronounced degree for many years, and the present trend is towards a general adoption and practice of ideas never before so freely used.

This tendency is seen in the design of a three-coach unit, in which, in order to secure the greatest strength with the least amount of material, a train of tubular cross-section was adopted, with the outer surfaces of aluminium sheets and frame-work built up of extruded aluminium-alloy sections All the metal in the framing is co-ordinated to act as a unit, as it is impossible to deflect or stress any member without adjacent members bearing their proportion of the stress. This is at variance with the ordinary form of coach design where shocks are taken by longitudinal underframe members. The underframe transmits certain loads to the side frame and the roof, but due to its design, only part of its area can be utilised for load carrying; in other words, in the conventional type of coach construction, much of the material or section does not take its proper part in bearing its share of stress. Assuming the cross-section of the car to be a tube, there was naturally obtained a very large moment of inertia, which means minimum deflection.

The old idea that weight is essential to keep coaches on the track is giving way to the view that dead weight is less important in this respect than proper location of the centre of gravity with respect to rails and a more complete control of the vibration of coaches with their loads. The adoption of alloy steels of high tensile strength and aluminium to replace mild carbon steels, especially where welding is used instead of riveting, is contributing importantly to the reduction of coach weight. Welding of alloy steels presents a special problem in railway equipment since it is essential that minimal changes be produced in the character of the steel to maintain its strength and corrosion resistance. The welding of thin plates required for sheathing coaches was a particularly difficult case. The solution of this problem has, however, been successfully accomplished by electric welding methods based on the instantaneous development of welding temperatures in very small areas. Members of larger cross-section caused less trouble.

Railway Enthusiasts in the U.S.A.

WHEN an institution in America has achieved the distinction of being made the subject of amiable jokes on the wireless and the variety stage, it may well be regarded as having become a fixed aspect of the national scene. And that is the status now enjoyed by the railway " fan " movement in the United States. For though full-size railways in America are in a bad way, times have never been more bright for the amateur or model enthusiast. " Fan," the etymologists assure us, comes from " fanatic," and it must be recognised that there are elements of mild fanaticism in the zeal with which America's railway amateurs have embraced their avocation. Almost every large city in America has at least one model railway club, as well as its isolated individuals who collect old timetables or locomotive photographs. Excursions of rail enthusiasts through roundhouses or car-wheel shops are a familiar occurrence. And throughout America are such miniature railway systems as the Sierra Pacific, the Hudson Central & Atlantic, the North Jersey Rapid Transit, and others of unfamiliar title.

The railway urge in America manifests itself in as many and diverse channels as it does in England. There are those who spare themselves the expense of equipment by going in for the gathering of railway lore and legend. There are those who buy parts and supplies from any of the score or more companies catering to this trade, as well as the stouter blades who build their own models out of raw stock. There are addicts to electrical motive power and there are the " live-steamers." Nor is the mania confined to the indoor, inch-gauge school of railroading. The all-weather, outdoor railway systems range in size all the way from a gauge of a few inches up to the full-size, 4 ft. 8½ in. clan. It is even reported that one zestful railroad amateur indulges himself in the ownership of nine standard-size locomotives. His wife at least enjoys the satisfaction that he does not clutter the attic or basement with his ponderous trinkets. As in England, the urge for collections has laid its firm grip on the American railway fan. The usual forms of specialisation are in some types of equipment, an historical era, or a particular locale. Photograph collections are common, as well as assortments of timetables, tickets, operating schedules, equipment, catalogues, badges, uniform buttons—even ticket punches. A Connecticut man rejoices in a collection of ninety old railroad lanterns.

For a long time, the railway managements themselves were either outrightly hostile or at least indifferent toward the mounting interest of the amateur. But they are now realising that cultivation of the railway fan movement is a sure way of building a large and loyal body of railway well-wishers. And in a country which is as sadly beset by anti-rail legislators as the United States, the " fan " is a factor. The chief outlet for this increased appreciation on the part of railway executives has been in their organisation of a great many trips and tours for railway enthusiasts. Some of them are for the small-boy element and others for the mature connoisseur. One such expedition, in which the officials doubted if there would be enough interest to fill an extra car on a regularly scheduled train, attained such gratifying proportions that it required two special trains each of seven coaches, two dining cars, and a Pullman observation car. Those whose hobby is the railway have not only their numerous local societies but also their national organisations. Among these are the Railway and Locomotive Historical Society, founded in Boston in 1920; the National Model Railroad Association, whose annual conventions bring out some of America's finest railway models, and the Railway Enthusiasts, which is affiliated with the Railway Correspondence and Travel Society of Great Britain.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Reducing Rail Side Wear

73, Clarendon Rise, Lewisham, S.E.13
January 13

To the Editor of The Railway Gazette

Sir,—Your editorial under the above heading in your issue of November 26, 1937, is certainly interesting and instructive. Flange wear and consequently rail wear on curves is, in existing circumstances, excessive, but that it should require renewal of the rails every few weeks is abnormal. It is a well-known fact that increased side play between the journal and bearing allowing greater freedom round curves, reduces flange wear, and thus rail wear, but to obtain steady riding this increased side play, which may be extended to as much as ½ in., must be controlled. Therefore, an effective self-aligning axlebox, preferably of the roller-bearing type, together with rail lubrication, should go a long way to solving the problem, if not entirely eliminating it.

Yours faithfully,
W. CARROLL

The Russian Railway Centenary

137, Icknield Way, Letchworth
December 10

To the Editor of The Railway Gazette

Sir,—Referring to your issue of November 5, page 797, I would point out that the corresponding date to October 30, 1837, old style, would be November 11, 1837, new style, the difference then being 12 days. In 1937 the difference is 13 days and perhaps this is what you intended to convey. The difference of one day in the century is, of course, accounted for by the fact that February 29, 1900, existed in the Julian Calendar (or O.S.), but not in the Gregorian Calendar (N.S.).

In such circumstances the particular day to accept as the anniversary is rather a problem.

Yours faithfully,
H. V. BORLEY

[Our correspondent is quite correct in assuming that we meant to indicate November 12 as the present new-style equivalent for celebrating the centenary of the formal Russian opening of October 30, 1837. The fact that the N.S. date a hundred years ago was November 11 is shown by the extract from *The Railway Magazine* of January, 1838, which we published in our Scrap Heap columns on January 14.—Ed., *R.G.*]

New Midland Timetables

56, St. Mary's Mansions,
Paddington, W.2
January 17

To the Editor of The Railway Gazette

Sir,—If Mr. Warner refers to the pre-war Midland timetables, he will find that from 1910 to 1914 considerable efforts were made to encourage holiday traffic to the Settle and Carlisle line, following on the very successful exploitation by the North Eastern Railway of the attractive moorland country served by their line. There was a summer through carriage on the 11.30 a.m. from St. Pancras to local stations north of Hellifield; the Scotch expresses, by stops at Hawes Junction (Garsdale), Kirkby Stephen or Appleby, gave good communication with the whole district; and through trains ran between the L. & Y. line and Ingleton. It is certainly strange that the Settle-Appleby area has not yet been covered by the holiday run-about tickets, but reduction of the running-time required between Leeds and Carlisle should now enable many pre-war facilities to be reinstated without any worsening of the throughout journey. The Midland schemes for post-war train service in this area contemplated not only the full restoration (in summer) of the Settle and Carlisle local facilities, but the provision of a morning and evening residential service between Grange, Windermere, &c. and Skipton, Bradford and Leeds, with connections from and to the Appleby-Settle area, which might well prove remunerative today.

But it seems to me that much of the criticism of the services between St. Pancras (or Euston) and the West Riding and East Lancashire districts overlooks the fact that London traffic in these areas originates at a number of small stations, and that a Stockport-Colne or a Sheffield-Bradford (Exchange) train has a great many intermediate points to serve. It is true that when the Yorkshireman first ran to St. Pancras in March, 1925, it had a non-stop run from Bradford to Sheffield, but the train service over the Royston-Thornhill line, since its opening in July, 1909, has always had to cater for innumerable small stations north and west of Thornhill. The Colne-Accrington area, which Mr. Warner now quotes, is probably far more advantageously served *via* the Western than it could be *via* the Midland Division, and occasional passengers from the Colne end of it have connections available *via* Skipton. I imagine, too, that the district has a greater affinity with Birmingham than Leicester.

Yours faithfully,
R. E. CHARLEWOOD

Accessibility of Locomotive Parts

London, N.W.11
January 24

To the Editor of The Railway Gazette

Sir,—I notice that in your editorial headed "The Boiler and the Axle Load" on page 99 of your issue of January 21, you call attention, in referring to the new locomotives for the Bengal-Nagpur Railway, to the fact that the cylinders and steamchest covers can be removed, and the pistons and valves withdrawn without interfering with or taking down other parts. Surely this is no uncommon feature in modern locomotive design, and it seems almost incomprehensible that any designer would so arrange these parts that structural portions had to be removed before the covers could be taken off.

Yours faithfully,
J. SMITH

[It is usual nowadays for the framing and other parts of locomotives to be so arranged that they do not interfere with the removal of the cylinder and steamchest covers, but there have been innumerable cases of the opposite kind, and in one class of engines on the Continent it was actually necessary to remove the buffer beam to allow of this being done. Probably, if an investigation were made into the matter, it would be discovered that a fairly high proportion of locomotives possess the fault referred to.—Ed., *R.G.*]

Burroughs Electric Fanfold Machine.—A new electric fanfold machine which reduces carbon shifting to one simple motion has recently been put on the market by Burroughs Adding Machine Limited, of Chesham House, 136, Regent Street, London, W.1. The functions of a fanfold machine are to type multiple sets of continuous forms and to shift the carbons from a complete set to the next set to be written. The carbon shifting usually requires a number of movements, but the new machine reduces it to one simple operation. When the invoice or other form has been typed, the touch of a motor bar opens the carriage for the removal of the forms and automatically places the carbons in the next set of forms. It is a very fast and easy operation and is fascinating to see demonstrated. The new machine has electrified carriage return, capital shift and space up, so that all the work except tearing off the completed forms is handled from the keyboard.

PUBLICATIONS RECEIVED

A Yearbook of Railroad Information, 1937 Edition. New York: Committee on Public Relations of the Eastern Railroads, 143, Liberty Street. 6 in. × 4 in. 96 pp. Gratis.—This useful little book is prepared by the Western Railways Committee on Public Relations and published by the Committee on Public Relations of the Eastern Railroads in the U.S.A. Its purpose, like that of its predecessors, is to make generally available accurate information regarding the U.S.A. railroads. It covers returns for the year 1936 and therefore is published at the end of 1937; its year of currency is the present one. The facts it contains are largely graphic and statistical, and these portray, despite depression and increased competition, an almost unbroken record of the improved efficiency and economy in American railroad operation. The booklet is adequately indexed, and thus the wealth of information which has been compressed into 96 pages is made readily available for reference.

Locomotion in Victorian London. By G. A. Sekon. London: Oxford University Press, Amen House, Warwick Square, E.C.4. 9¼ in. × 5¾ in. × 1¼ in. 211 pp. Illustrated. Price 12s. 6d. net.—Mr. Sekon's name is doubtless well known to many of our readers as a writer on transport subjects, although many years have passed since we have seen a new volume from his pen. Some forty years ago, when interest in accurate transport history was by no means so general as at the present time, Mr. Sekon was a pioneer in bringing precise railway knowledge and historical accuracy to bear upon the popular presentation of railway subjects. It was during that period that his *History of the Great Western Railway*, *History of the South Eastern Railway*, and *History of the London and South Western Railway* made their appearance. He was also responsible for a *Dictionary of Railway Words and Phrases* and a work on the *Evolution of the Steam Locomotive*.

Now that works on the Victorian era are being published—almost every week, it seems—an account of locomotion in Victorian London from so authoritative a pen forms a welcome addition to such literature. Mr. Sekon has limited himself to the period between the years 1837 and 1900, and although he explains in his prefatory note that his personal experiences cover only the last thirty years of that time, his lifelong study of transport has enabled him to present a fascinating story of the whole of London transport during the reign of Queen Victoria. When the Queen came to the throne, all but the very richest Londoners went to and from their work on foot, and public omnibuses had only recently been introduced. At the end of the reign, buses, river steamboats, cabs, tramways, and railways all played their part in providing for the local transport of hundreds of thousands of persons a day, and how this came about is the story which the author unfolds. The style is chatty and yet precise, and the illustrations make a very fine collection. Many of the pictures are from very scarce originals, some of which we do not recollect ever having seen reproduced before. The volume, which is adequately indexed provides an interesting and well-balanced account of all means of public transport in the Metropolis during a lengthy and most eventful period.

Electrical Year Book, 1938. London: Emmott & Co. Ltd., 28, Bedford Street, Strand, W.C.2; Manchester, 3: 31, King Street West. 6⅜ in. × 4 in. × ½ in. 312 pp. and diary. Illustrated. Price 1s. 6d. net.—This publication is uniform in size and price with the *Mechanical World Year Book*, from which it differs outwardly by having a green cover instead of a red one. Like its companion, the *Electrical Year Book* is a remarkable production for the small sum of eighteenpence. Information is provided upon nearly all branches of electrical engineering, including electric and diesel-electric traction, and there is a diary at the end. Not quite the same care seems to have been taken with this year book as with the mechanical one to keep it up to date, though we imagine that the page number errors in the index are an unforeseen consequence of partial revision. Mathematical tables are included, but, since vector-diagram a.c. calculations are described, there should have been one giving the values of the trigonometrical functions. We do not doubt that the book will be acquired by many draughtsmen, designers, and students, or that it will be valued by these above possessions costing several times the amount.

Great Western Railway Magazine. Vol. XLIX, 1937. London: Great Western Railway, Paddington station, W.2. 9½ in. × 7½ in. × 1¼ in. 588 pp. Illustrated.—The bound issues for 1937 of the *Great Western Railway Magazine* form a substantial volume that is not only a record of railway work and achievement during the year, but something of a guide and picture gallery of the counties served by the company's lines. This collection between two covers of the articles published in the magazine on Coronation traffic working—including the itinerary of the royal train during the visit of the King and Queen to South Wales—forms a valuable memento of an historic occasion. The Coronation period also inspires a retrospect entitled "The G.W.R. from one Coronation to Another," recalling such interesting phases in the company's development as the first Pacific locomotive in this country (*The Great Bear*); the evolution of railcars from the steam rail-motor to the present fleet of oil-engined, streamlined vehicles; and the reconstruction of Paddington station, which has resulted not only in greater convenience for travellers joining and leaving trains, but the provision of such additional facilities as a platform post office, shops, and a popular snack bar.

Highest and Lowest Prices. London: Fredc. C. Mathieson & Sons, 16, Copthall Avenue, E.C.2. Price 2s. 6d.—The January, 1938, issue of this monthly and yearly publication contains a diary of the principal events in 1937 affecting prices, and the highest and lowest business marked monthly for each month of the year 1937 and also for the past six years, of selected active stocks. A series of interesting notes is also given and a table of the minimum bank rates of discount.

Calendars for 1938.—We acknowledge with thanks the receipt of calendars for 1938 from the following:—

British Oxygen Co. Ltd.; Committee on Public Relations of the Eastern Railroads, U.S.A.; Dacres, Rabjohns Limited; Deutsche Werke, Kiel, A.G.; Economical Boiler Washing Co. Ltd.; Harland & Wolff Limited; Railway Convalescent Homes; Vitrea Drawn Sheet Glass Co. Ltd.; Watson, Laidlaw & Co. Ltd.

Distribution Pillar Units.—Five-core distribution units for use in B.I. pillars are described in a pamphlet from British Insulated Cables Limited, Prescot, Lancs. In the "36" type unit, the busbar fuse contacts are screwed direct to the busbars, so that one contact surface is eliminated and economy in space realised. For further compactness there is a shorter five-core unit that can be accommodated in B.I. pillars originally designed for three-core equipment. In both types the fifth core fuse is accommodated on the unit itself.

A Tungsten Carbide Tool Metal.—We have received from A. C. Wickman Limited, Coventry, a catalogue of tools and tips in Wimet, a special cemented tungsten carbide material made in seven grades. Some interesting applications of the material are shown in an illustrated section of the catalogue where various types of reamers, milling cutters, drills, machine centres, gauges, and other accessories are represented. As correct grinding is important to efficiency, special types of grinding wheels for Wimet tools have been developed, and the catalogue gives some useful illustrated hints on the correct procedure for their use.

Machine Tools.—An illustrated survey of some special machine tools recently produced is presented in a pamphlet which we have received from John Holroyd & Co. Ltd., of Milnrow, Lancashire. A section is devoted to railway shop tools, including axle journal re-turning and grinding machines; horizontal slot and cotterhole drilling machines; vertical slot drilling machines; and a smoke tube turning and screwing machine. The firm has also provided specialised equipment for internal combustion engine manufacture, such as multi-spindle cylinder boring machines, capable of dealing simultaneously with all bores in a block; and 12-spindle machines for grinding-in valves.

THE SCRAP HEAP

Ticketless travellers on the Bengal & North Western Railway are estimated at an average of nearly 900 a day, and 315,247 of them were caught in 1937. The company calculates that these stolen rides cost them 200,000 rupees.

* * *

TRANSATLANTIC AIRSHIPS

A plant for purifying helium gas is being installed at the Rhine-Main airport near Frankfort. This is in readiness for the scheduled trans-oceanic flights of the new zeppelin L.Z.130 which will begin next spring. Gas which has become impure will be taken out of the airship by means of suction pumps and transferred to the refining plant, where the gas will be cooled to a temperature far below zero (Celsius) and all impurities will be separated from the pure helium either by liquefying or by freezing, the helium meantime retaining its gaseous state.

* * *

During 1937 some 250 million cubic metres of earth were removed in the construction of the German Reichsautobahnen. This figure makes an interesting comparison with the 220 million cubic metres removed in building the Panama Canal. More than 10 million cubic metres of concrete have been used in making the traffic lanes, detours, bridges, and viaduct crossings, and over four million tons of cement, or 260,000 railway trucks full, have been delivered.

* * *

DEMANDS ON RAILWAY COMPANIES

Among the almost innumerable cases that have occurred of high demands on railway companies, and the awards of juries, we select the following. Great Western Railway: for land at Hanwell, claimed £2,300, Company offered £750, jury awarded £600. Two cases at Bath: claims £6,780, and £9,000, offers £4,500, and £4,500, award £4,223 and £3,375. These three cases are given in Nos. 11 and 19 of *The Railway Magazine*. Birmingham & Gloucester Railway: one case claimed £4,000, offers £700, award £750. Another claimed £8,000, offered £800, took without award £850. Hull & Selby Railway: First case claimed £453, award £102, or £34 beneath Company's offer. Second case claimed £736, award £102 8s., or £46 8s. above Company's offer. Third case claimed £652 4s., award £170 19s., or £79 19s. above Company's offer. Fourth case claimed £4,377 10s., award £425, or 10s. below the Company's offer. Fifth case claimed £5,796 11s. 7d., award £1,253 10s. 6d., or £303 10s. 6d. above the Company's offer. Sixth case claimed £3,312, award £531, or £321 above the Company's offer. Seventh case claimed £1,287 18s. 6d., award £704 18s., or £149 18s. above the Company's offer. In these seven cases the total amounts claimed were £16,615 4s. 1d., total awards £3,289 15s. 6d., or no less than £13,325 8s. 7d. beneath the claims, and £866 8s. 6d. above the companies' offers. The sums claimed, therefore, were upwards of 400 per cent. above the actual awards. Eastern Counties Railway: This concern, too, has had a couple of cases marked by the extravagance of the demands. One case was a claim for £1,156, and the jury gave £10. The other was a claim for £1,436, and the award was £565.—*From "The Railway Magazine" of January*, 1838.

* * *

The directors of the Midland Company have made an important concession to the public, which will be fully appreciated by those who are in the habit of travelling over the Midland system. They have decided, on and after April 1, to book third class passengers by every train, both express and ordinary, to and from all their stations. It appears that the Midland is the first of the large companies to make this very important improvement.—*From "The Times" of March* 20, 1872.

* * *

FORTY YEARS AGO IN BULAWAYO

At 3 o'clock on the afternoon of Tuesday, October 19, 1897, the first train steamed into Bulawayo. The official opening of the line from the south took place on November 4, in that year, four years after that historic day when the Salisbury and Victoria columns entered the ruins of the kraal of Lobengula. Four special trains arrived at Bulawayo during the day, conveying over 200 guests and the hospitality offered to the visitors was estimated to have cost about £12,000. In reply to an address of welcome, His Excellency the High Commissioner, Sir Alfred Milner, conveyed a message of appreciation of the work of the settlers from Mr. Joseph Chamberlain, the then Secretary of State for the Colonies, and through Earl Grey, Her Majesty Queen Victoria sent the following message from Balmoral: "The Queen desires me to convey to the people of Bulawayo her heartiest congratulations on the arrival of the railway, and her good wishes for their future prosperity."—*From the "Rhodesia Railways Bulletin" for October*, 1937.

* * *

A Dublin reader writes to ask whether the misprint on page 122 of last week's issue, in which Eire was spelt Erie, was due to ignorance. During a recent visit to London he was, he says, astonished at the number of different ways in which the name Eire was being pronounced, and our misprint has now moved him to compile and submit to us the following verses. He marks his MS. "For the Scrap Heap":—

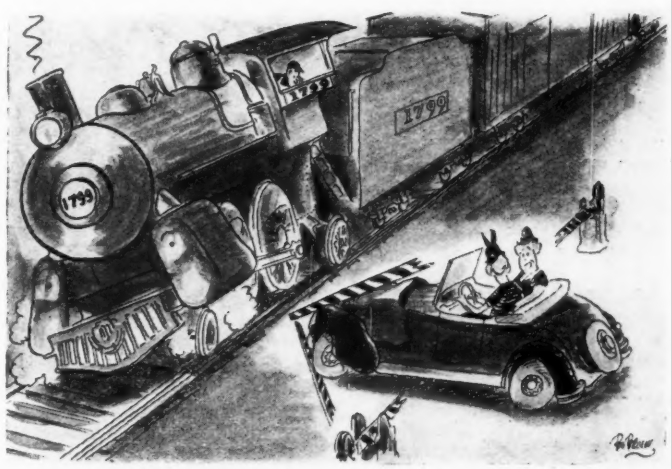
EIRE

I must confess it makes me weary
To hear the name pronounced as *Eerie*.
I also am inclined to tire
Of people who insist on *Ire*.
An Irishman must think it queer
When asked, "How goes it now in *Ear*?"
Or when a railway man in Clare
Is blamed for traffic faults in *Air*.
The right way, though it may sound rarer,
Is as the "Eire-ish" say it, *Airer!*

"And," writes our correspondent, "to end with"—still utterly ignoring all the rules of poetry—and license, and with a certain contempt for English:

"The locomotive now called *Eyre*
Will have to change its name to *Eire*."

"1799—ISN'T THIS THE SAME ONE WE RAN INTO LAST WEEK?"



—*From Rockefeller Center Weekly*

OVERSEAS RAILWAY AFFAIRS

(*From our special correspondents*)

VICTORIA

Miscellaneous Rolling Stock Notes

Like the four all-steel air-conditioned, streamlined buffet cars built as spare vehicles for the Spirit of Progress train, all future main-line coaching stock is to be built to conform generally with the exterior design of that train. Six air-conditioned sleeping cars are also to be constructed during 1938 to the same pattern, for joint service over the Victorian and South Australian lines, for the overland service between Melbourne and Port Pirie. For, when the new Trans-Australian service comes into force shortly with the introduction of the new Commonwealth Railways locomotives, a through service will be provided between those places without intermediate change at Adelaide.

The first two of these locomotives will be shipped from Maryborough, Queensland, to Port Augusta (South Australia) by sea during December (1937), and two more each month until the order is completed.

Inaugural Ceremony of the Spirit of Progress

On November 17 the Premier of Victoria officially named the new semi-streamlined, Cor-ten steel, air-conditioned train for the Melbourne-Albury service "Spirit of Progress," and unlocked the parlour car with a gold key, to open the train to the public, at Spencer Street station, Melbourne. In introducing the Premier, Mr. Harold W. Clapp, Chairman of Railway Commissioners, described the outstanding features of the train, which, he said, was their complete answer to all other forms of transport. A distinguished party of guests, including several commissioners of various railways and representatives of the Commonwealth and States, then boarded the train for the inaugural run to North Geelong and back. The train was made up of nine coaches—the baggage, mail, one first and one second class car being omitted—and weighed 390 tons. Hauled by "S" class three-cylinder Pacific locomotive No. 302, *Edward Henty*, it covered the 42¾ miles in 54 min. on the outward, and in 51 min. on the homeward run despite 5-m.p.h. speed restrictions over the Werribee River bridge and other slacks, maximum speeds of 74 and 79 m.p.h. being attained. During a subsequent special run a speed of 84 m.p.h. was reached.

Features of these runs were the absence of noise due to the double safety glass windows installed in connection with air-conditioning, which, together with sponge rubber leather-upholstered seats, provides luxurious comfort. The running throughout was remarkably smooth at all speeds. This is due largely to 90-lb. rails welded into 225-ft. lengths, and to additional sleepers and ballast inserted to strengthen the permanent way.

The enginemen remarked on the easy starting of the train attributable to its equipment throughout with Timken roller bearing.

The Spirit of Progress has been the subject of intensive publicity propaganda in the form of booklets, news items and illustrations in the press, and a special coloured souvenir of the inaugural run. But the most striking advertisement is the largest railway poster ever produced in Victoria, 8 ft. 4 in. × 3 ft. 4 in., the work of a Melbourne artist, showing the complete train in correct colours.

[This poster was reproduced in black and white on page 28 in our issue of January 7.—ED. *R.G.*]

The complete train consists of a baggage car, mail car, five first class and four second class cars, dining car, and parlour observation car, 13 vehicles in all, accommodating nearly 500 passengers.

CANADA

Moving a Station Bodily

The Canadian Pacific Railway has recently moved a station building bodily a distance of 44 miles from Loyalist to Castor, in Alberta. Castor station was destroyed by fire, and it was decided to replace it by removal of the station from Loyalist. This is not an uncommon practice in Canada, where stations are of wooden construction, but this case was unique in that Loyalist is one of the larger of branch line structures, being a full-size station with large freight shed. Some of the smaller flag stations have only a small or no freight shed, and merely a small platform and office.

In this instance the station was jacked up and the foundations removed, a spur track was temporarily constructed underneath the raised buildings, and flat cars backed into position. The station buildings were then lowered on to the cars, and the station proceeded by train to enter a new era of service at Castor. [Illustrations of this station being moved will be found on page 186.—ED. *R.G.*]

The Grand Trunk Claims

The Lovibond case was revived on December 27, when the Court at Toronto extended to January 10 the period for the plaintiffs to find a further amount of $4,000 for security for costs to continue the action. Lovibond in the original writ claimed to represent the holders in Great Britain of preference and common shares of the Grand Trunk Railway, now merged in the Canadian National. He contended that the Acts by which the merger was effected were invalid and that 7,000 shareholders were entitled to compensation. The Privy Council found that Lovibond had a right to maintain the action for personal damages, but the Ontario Courts ordered the statement of claim amended to show that the claimant was acting only as an individual. He has now been served with a motion for dismissal of the action.

ARGENTINA

Cordoba Central Railway: Lease Extended to Four Years

The period during which the above railway will be leased by the Argentine Government was extended by a Decree issued on December 29 by the Ministry of Public Works to a maximum of four years instead of one year, as previously stipulated, and as announced in THE RAILWAY GAZETTE of November 26 last. It is stated that the period of one year was inacceptable to the London board of the company, which declined to accept the agreement as originally drafted, and demanded that the entire staff should be retained and the present organisation preserved, so that at the end of the lease, in the event of the purchase of the line by the State not being sanctioned by Congress, it would not be necessary to reorganise the whole concern. On the other hand, the State Railways administration, which is to operate the line, urged that it should be left free to make such economies as might be required by the restoration of the wage and salary deductions previously in force, and to reorganise the services so as to improve the traffic returns.

It was eventually agreed by both the Government and the company that the duration of the lease should be extended, and the London board proposed that the State Railways should undertake the operation of the line for a further period of three years, the purchase option to be left open, the sum of £380,000 sterling, equivalent to 4 per cent. on the purchase price of £9,500,000 being paid annually in respect of hire. The basic conditions under which the line is to be leased, as set out in the Decree, are as follow:—

The duration of the lease must not exceed four years, and it will automatically lapse if Congress ratifies the purchase agreement in the meantime. The annual sums of £380,000 shall be paid in equal monthly instalments by means of sterling drafts on Baring Bros., London. In the last year, however, if the purchase Bill has not been approved by Congress, the amount payable by the Government will be only $3,726,000 paper, that being the amount of the net profits of the company during 1936-37.

The State Railways will undertake the necessary expenditure on the maintenance of track, rolling stock, plant, and equipment, returning them at the end of the lease in the same condition as they were received in, allowing for ordinary wear and tear. Renewals

will be charged to the company up to a maximum of $700,000 paper per annum, and must not be less than the sum spent in that respect during 1936-37, namely $546,000 paper.

While the lease is in force, the State Railways may not modify the existing tariffs except by order of the Government, and any changes in the time-tables or organisation must be communicated to the company. When purchasing materials, preference shall be given—prices and other conditions being equal—to those stocked by the company.

The entire staff will be transferred to the new administration, at present salaries, subject to such deductions as are in force on the State Railways, but the company may retain such employees as are deemed indispensable to attend to pending matters, transferring them, when no longer required, to the State Railways. If the purchase of the line is not approved by Congress, measures must be taken to re-establish the previous organisation by the time the line is returned to the company.

Simultaneously with the signature of the lease agreement, the contract for the sale of the line will be renewed *ad referendum* of Congress.

Railway Statistics, 1927-36

The *Instituto de Estudios Economicos del Transporte* has issued the third part of its general statistics relating to the working of the Argentine railways.* This summarises the financial results from 1927 to 1936, both for the individual systems and for the whole of the railways. The following is an extract of the principal statements:—

Year	Gross Earnings pesos	Working Expenses pesos	Net Earnings pesos	Interest on Capital per cent.
	(thousands omitted)			
1927 ...	646,720	459,577	187,143	4·99
1928 ...	655,668	472,068	183,600	4·70
1929 ...	650,585	484,405	166,180	4·01
1930 ...	546,516	434,455	112,061	2·58
1931 ...	539,203	423,364	115,839	2·56
1932 ...	479,112	387,323	91,789	2·06
1933 ...	452,519	377,205	75,314	1·68
1934 ...	489,030	370,839	118,191	2·64
1935 ...	494,577	380,748	113,829	2·51
1936 ...	501,240	385,150	116,090	2·56

A statement is also given showing the index number of each year's results as compared with the year 1927 as 100:—

Year	Gross Earnings	Working Expenses	Net Earnings (excluding loss on exchange)	Interest on Capital
1927 ...	100	100	100	100
1928 ...	101	103	98	94
1929 ...	101	105	89	80
1930 ...	85	95	60	52
1931 ...	83	92	62	51
1932 ...	74	84	49	41
1933 ...	70	82	40	34
1934 ...	76	81	63	53
1935 ...	76	83	61	50
1936 ...	78	84	62	51

In all these figures the results are those of all the railways of the Republic, including the lines of the State owned and managed railways. In the actual statement of the institute, however, the totals are given for the nine privately owned lines and a separate total is given for the whole system.

The following are the index numbers corresponding to the interest on the working capital represented by the net earnings of the principal British-owned railways:—

Year	B.A.G.S.	B.A.P.	Central Argentine	Western	Central Cordoba	Entre. Rios
1927 ...	100	100	100	100	100	100
1928 ...	76	128	95	92	109	131
1929 ...	70	106	77	79	78	84
1930 ...	55	71	54	37	38	79
1931 ...	45	68	66	46	49	63
1932 ...	56	43	51	27	17	47
1933 ...	54	37	21	31	3	10
1934 ...	52	60	65	40	28	29
1935 ...	52	73	53	33	30	28
1936 ...	44	62	61	33	39	27

No explanation is afforded of the method used for arriving at the figures of interest per cent. represented by the index numbers given. It is, however, specifically stated that differences arising out of exchange are not taken into account.

Summer Train Services

In anticipation of the usual heavy passenger movement to the various holiday resorts during the summer season, most of the railways have augmented and accelerated their services, in addition to making substantial reductions in fares.

Buenos Ayres & Pacific Railway

The day express, El Cuyano, equipped with Pullman, and dining cars, and first and second class coaches, which was put on in May last between Buenos Aires and Mendoza as a bi-weekly service, now runs four times a week in each direction, leaving Buenos Aires at 7 a.m. on Mondays, Wednesdays, Fridays, and Saturdays, arriving at Mendoza at 10.30 p.m. The return journey is made on Sundays, Tuesdays, Thursdays, and Saturdays, leaving Mendoza at 8 a.m., and arriving at Buenos Aires at 11 p.m.

During the summer season, three trains are being run every week, connecting with the Transandine and Chilean State Railways, leaving Buenos Aires on Sundays, Tuesdays, and Thursdays at 11.30 a.m., the time of arrival at Santiago or Valparaiso being shortly before midnight on the following day. The return trains leave Santiago or Valparaiso on the same days at 7.30 p.m., arriving at Buenos Aires at 4.45 p.m. on Tuesdays, Thursdays, and Saturdays. The first class return fare, including sleeping accommodation between Buenos Aires and Mendoza in both directions, is $194.00 Argentine paper for adults, and $116.00 for children.

(*Note.*—The current free rate of exchange is approximately $17.00 Argentine paper to the pound sterling.)

* The first part, relating to passenger traffic was reviewed in THE RAILWAY GAZETTE of November 12, 1937, page 817

INDIA

New Brahmaputra Bridge Proposed

Though the actual construction of a bridge between Amingaon and Gauhati—one on each bank of this river—has not been finally decided upon by the Railway Board, preliminary investigations into the project are in hand. The River Brahmaputra separates the Eastern Bengal Railway from the Assam-Bengal system and the proposed bridge will make it possible to travel by rail from any part of India to the eastern extremities of the country. Moreover, a certain amount of strategic value is attached to the project which may also be found useful should the scheme for a railway connection between India and Burma *via* the most northerly route ever be revived. The Assam Government suggests that the bridge should carry a road as well as the railway.

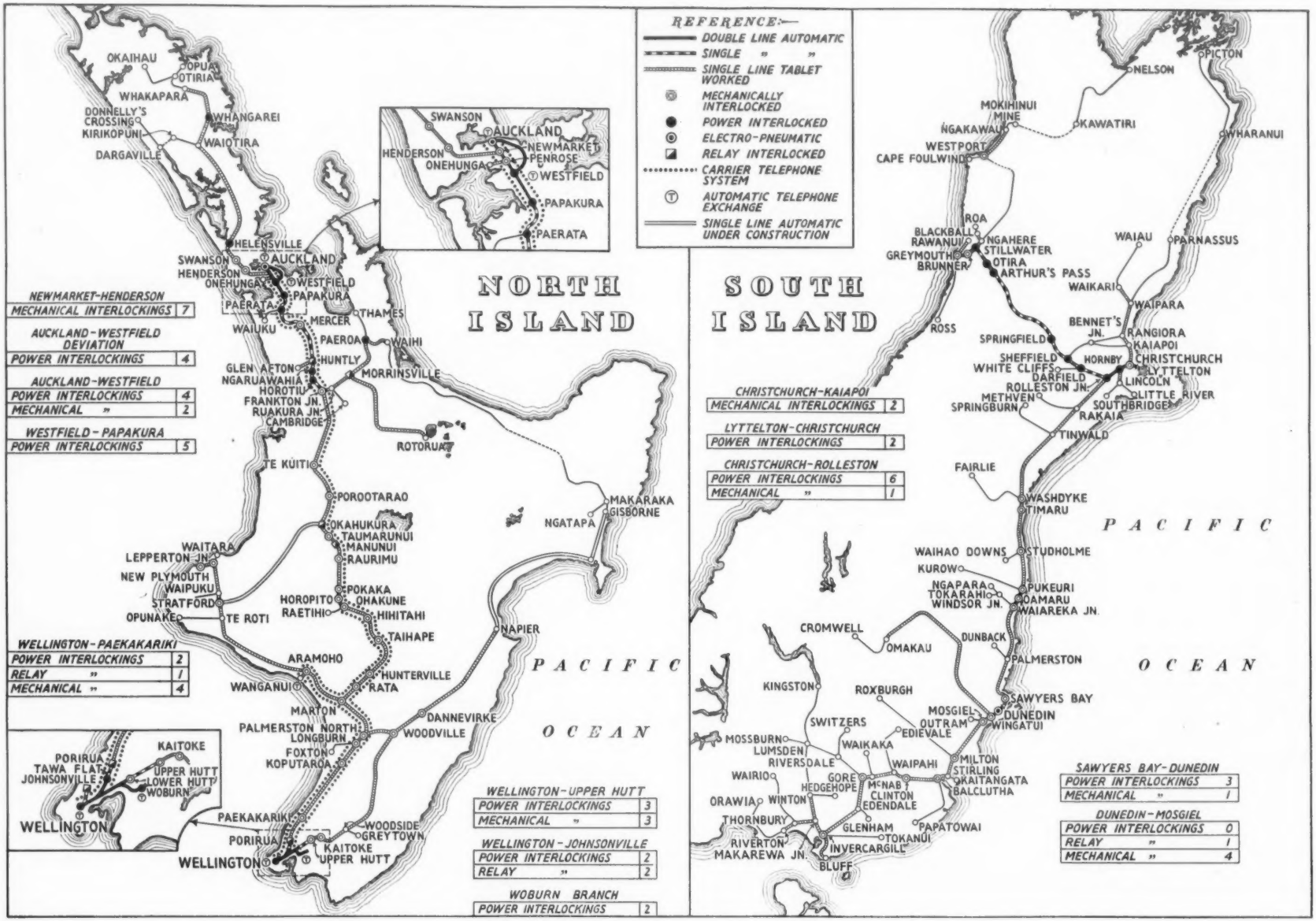
Preliminary Laboratory Research

In the neighbourhood of Amingaon, the river passes through a defile, but, even so, it is over 3,000 ft. wide. The bridge with its approaches is, therefore, likely to be about a mile in length. The release from the Meghna bridge works of considerable plant and equipment necessary for the construction of major bridges is likely to be an important factor in the financial justification of the bridge. It is also understood that valuable investigations are proceeding at the Irrigation Research Laboratory at Poona into the effect of the flow of the stream and the behaviour of the river bed under the varying conditions that obtain at different times of the year. For these experiments, it was necessary to build in miniature an exact model of the river in the Amingaon—Gauhati area and to regulate the flow of water to conform with conditions existing in this area. On the results of these experiments will depend the design of the bridge piers.

Festival Traffic Arrangements

The Mahodhyam Festival at Point Calimere on the South Indian Railway takes place on January 31, 1938. The railway administration expects that over a hundred special trains may have to be run on the occasion. A senior commercial officer has, therefore, been placed on special duty to supervise the arrangements that are being made at Point Calimere and adjacent stations for the comfort and convenience of the large number of pilgrims who are expected to attend the festival.

The South Indian Railway opened a railway inquiry office at the All-India Swadeshi and Industrial Exhibition held at Tiruvannamalai during the recent Krithigai festival. The office was of great help to the visiting public, and, in appreciation of these services, the exhibition authorities awarded a gold medal and a certificate of merit to the railway.



Map showing where the various systems of signalling are installed. New Zealand Railways

SIGNALLING DEVELOPMENTS IN NEW ZEALAND

A survey of progress during the present century

*By G. W. WYLES, Signal and Electrical Engineer, New Zealand Government Railways**

THE total length of railways in operation in New Zealand (see diagram) is 3,320 miles; the gauge is 3 ft. 6 in., and the track, generally speaking, is laid with 70-lb. rails, with lighter sections in some areas and heavier 100-lb. rail sections on some of the more recent work in the vicinity of Wellington and Christchurch.

Ballast varies considerably, volcanic scoria being used largely in the vicinity of Auckland, with broken stone and gravel on other sections. The percentage of curvature is very high, 28·3, involving considerable difficulties with effective signal sighting. The sections of line with single line automatic signalling from Stratford to Okahukura, and Napier to Gisborne (222 miles), in the North Island, are under construction. In the South Island the railway is being constructed between Wharanui and Parnassus, with a further section outside Westport on the west coast.

The existing double-line sections are in the vicinity of main centres, *i.e.*, Auckland, Wellington, Christchurch, and Dunedin, but the line between Papakura and Frankton Junction near Auckland, at present working under single line automatic signalling, is being doubled. Crossing loops are not shown on the diagram but an indication is given of the most important stations on the system.

Signal and Electrical Department

Signalling work in New Zealand is carried out by the Signal and Electrical Branch of the service, responsible for signalling, communications, power supply, and electric traction, apart from the rolling stock. It carries out construction and maintenance work with its own staff, the total number being approximately 600. The development of signalling dates from about 1900, although there were previously one or two instances where levers were placed in a central position for working some points and signals and some partial interlocking provided between them. The Winter block apparatus was also in use on some other sections of single line. Mr. Arthur H. Johnson, the late Signal and Telegraph Engineer of the former London and South Western Railway, came to New Zealand as the first Signal Engineer in 1898 and was succeeded in 1900 by Mr. H. J. Wynne, the first Signal and Electrical Engineer. In 1901 the first complete mechanical interlocking was installed at Wellington and the installation of table instruments over main lines was decided upon. Signals at crossing loop stations were introduced in 1904, and in 1907 the Wynne automatic tablet exchanger was installed. Power signalling was first used at Dunedin in 1908, being electro-pneumatic, and in 1909 lock-and-block was adopted for double lines. The locking of main-line siding points with tablet locks was begun in 1912 and Wood's key locks for all facing points at crossing loops on main lines were adopted in 1914 and interlocked with the home signal, traffic padlocks and cotters for locking the points being dispensed with. The author succeeded Mr. Wynne as Signal and Electrical Engineer in 1929.

Simultaneously with these developments, mechanical interlockings were being installed and in 1920 it was decided to instal the first automatic signalling on the double line sections between Wellington and Lower Hutt and later to instal single line automatic signalling between Lower and Upper Hutt. These installations are still in use. Since then there has been a continual expansion of automatic signalling, on both double and single line, and numerous power interlockings have been installed, until today there are in operation 190½ miles of single line and 78¼ miles of double line automatic signalling, with 32 power interlockings, mechanical interlocking at all important stations, the tablet system being used on the main lines and important branch lines not worked under automatic signalling.

The development of communicating apparatus has kept pace with that of signalling, progress over the last 20 years being from magneto telephone and Morse circuits with iron wire to twisted copper circuits using selective telephones and carrier systems, with a later development of teletype. The majority of the Morse circuits have been superseded, those still in use being superimposed on other circuits. Automatic telephone exchanges have also been installed at several places, and others are in hand. The Post and Telegraph Department's trunk lines come through the railway automatic exchanges so that communication can be obtained to individual offices.

Fig. 1 shows the general development of crossing loop signalling. The original layout had padlocked points and one home signal; then came Wood's locks and distant signals. Originally the home signals were not detected but this was added. Fixed signals are used for the main line but for trains entering the loop a traffic member operates the main-line points and hand signals the train in. The next development is equipping the main-line points with motors and providing mechanical loop homes at a number of places. Light signals at crossing loops are now seen and the recent innovation of placing the home signals some distance from the main-line points to allow of shunting within station limits after a tablet has been issued for an approaching train. A shunting stop board is provided allowing an overlap of 50 yd., and the loop home signal is worked by a ground lever at the points. Track circuits are provided between the home signal and the points for indicating and other purposes. Although mechanical signals are shown on the diagrams in a number of cases, light signals have been used, and will be frequently in future.

Increase of traffic makes it essential to provide facilities for shunting after the tablet has been issued, particularly with 5- or 6-mile sections, and there is a considerable amount of comparatively slow moving goods traffic. The provision of backshunts on the loop is preferable to moving out the home signals, but involves a scissors crossover and is very costly, particularly where the formation is difficult.

Automatic Signalling

All automatic signalling up to the present has been with 110-volt a.c., 50-cycle power supply. The Government supply covers practically the whole of New Zealand and there has been little difficulty in obtaining reliable power for signalling. The automatic signalling works now under construction are to be battery installations. It has

* Abstract of paper read before the Institution of Railway Signal Engineers on January 26, 1938.

been usual to obtain power supply at 3·3 kV. and run a 3·3 kV. line for the length of the section. Standby plant has been considered necessary in one or two instances, but in others complete reliance has been placed on the supply. Outdoor 3·3 kV./110-V. transformers are used at the various locations, and all relays, apart from track relays, operate at 110 V. Nearly all are vane relays. The tracks on double lines are polarised with no pole changing line wires.

All signals are three position, using speed rather than route signalling aspects for entry into the yards. When the double line work was first installed, it was decided to leave the existing mechanical signal boxes and provide control levers in the frames. Normally they are switched out and locked, but the mechanical connections to the points were left, and any necessary shunting is done either by a member of the station staff or the train crew. To switch a box in, the control levers must be used and the home signals placed at " danger," after which a time release is used to free the levers for working points and the necessary shunt signals. In order to provide for a variation in the indication of the home signal at such boxes, it is installed as a " stop and stay " signal, but equipped with an " A " light marker, illuminated when the box is closed. The driver, on reaching such a signal at " stop," waits the prescribed ten seconds and then proceeds in the same way as he does for a " stop and proceed " signal. Normally " stop and proceed " signals are equipped with a staggered marker. All double lines are now signalled automatically, the lock-and-block having disappeared in 1936.

Automatic Signalling on Single Lines

Fig. 2 shows a crossing loop on single line with automatic signalling, together with one pair of intermediate signals. It will be noted that there are home signals (or arrival signals as they are known in New Zealand) situated at the facing points, and starting signals (departure signals, in New Zealand). The former are " stop and proceed " signals, while the latter, controlling entry into the block section ahead, are " stop and stay " and can be passed at " danger " only under practically the same conditions as would apply to a train entering a tablet section without a tablet, *i.e.*, the instructions of the train control officer or by the use of a pilot-key, to be explained later. The sections between loops are divided into smaller sections by intermediate signals as may be required to handle traffic expeditiously, varying generally from ¾-mile to 1½ miles.

Departure signals are kept normally at " danger," because it was considered they took the place of the tablet and it created confidence for the train crews to see the signal actually clearing for them. A further reason was that with a normal clear departure signal a train at each

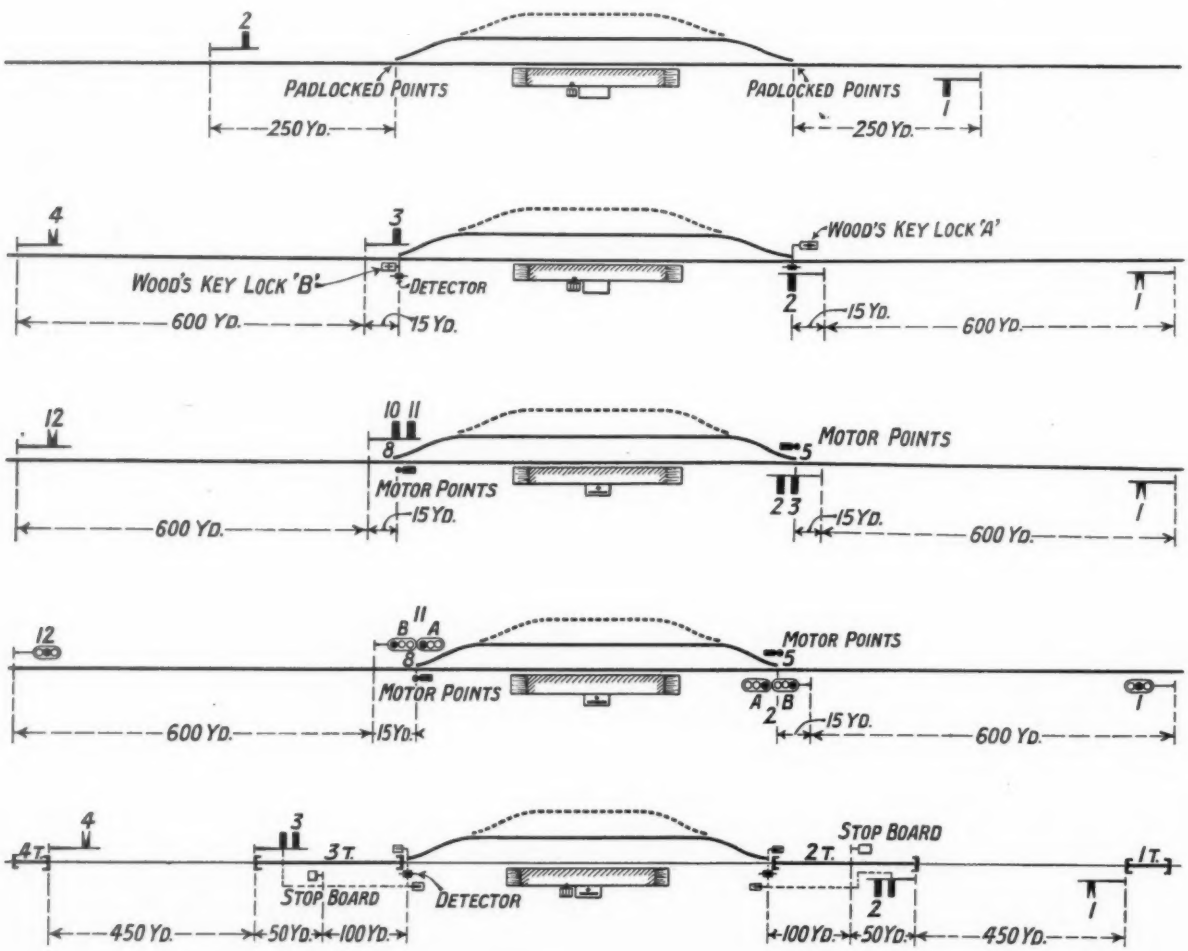


Fig. 1.—Development of crossing-loop signalling

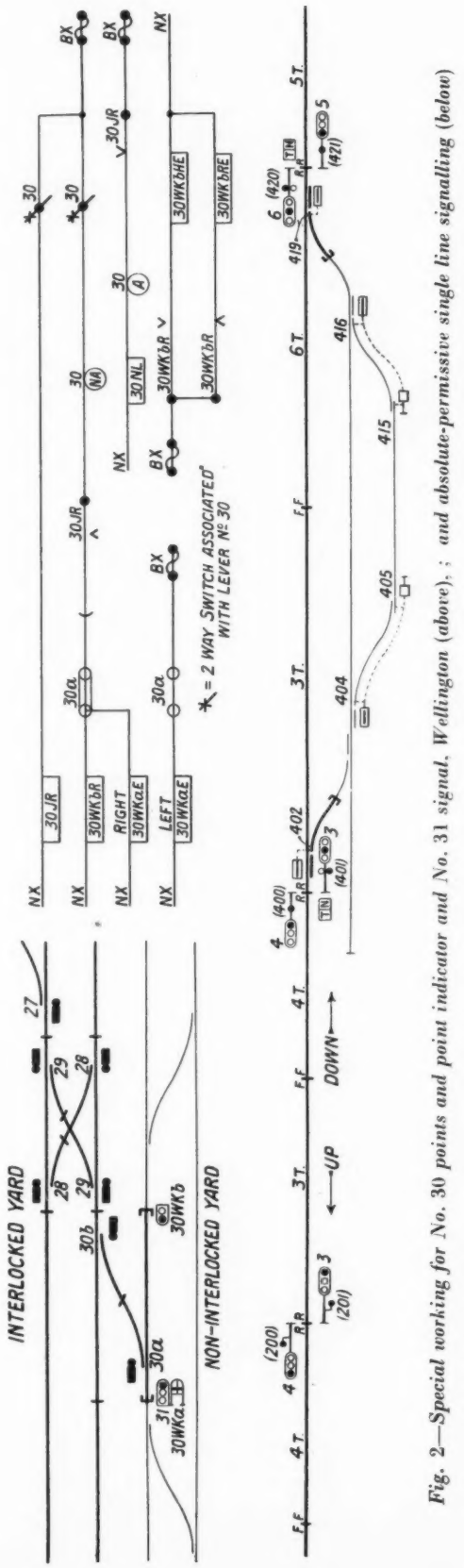


Fig. 2—Special working for No. 30 points and point indicator and No. 31 signal, Wellington (above), ; and absolute-permissive single line signalling (below)

end of the single line may simultaneously accept one, resulting in opposing trains being between loops at one time, although they would be stopped, of course, by the intermediate signals. This possibility does not exist with normal danger departure signals.

Operation of Points

Points are worked by train crews themselves at unattended crossing loops and there are as many as five loops in succession with no traffic staff in attendance. Where attended by a traffic member, the points are operated by him. A through train on the main line approaching a station begins to clear the departure signal, provided the block ahead is clear on reaching the approach track. The arrival signal will then go to green, indicating that the train may proceed into the next block section. If a crossing is to be made and a train is approaching from the opposite direction, the intermediate signal in the rear of the arrival signal will show a " caution " indication and give advance information of the conditions. This " double caution " indication, *i.e.*, a " caution " on the arrival and a " caution " on the intermediate in its rear, was specially developed for single line automatic operation and has proved very successful over a number of years.

If the train to arrive is to take the loop and cross another, it stops on reaching the arrival signal and the fireman reverses the crossover. This puts the arrival signals to " stop " and illuminates a letter " L," meaning that the route has been correctly set for the loop. On arrival in the loop, the guard re-sets the crossover, when the signals for the train approaching on the main line will clear for the block ahead if conditions are right. A train standing on the main line thus clears the departure signal for itself when the block ahead is clear, but, the loop not being track circuited, other arrangements for clearing the departure signal have to be made for a train standing in it. The fireman therefore pulls over the loop points, first opening the door of a plunger box and pressing the plunger. This clears the departure signal for the train to leave provided the block ahead is clear. After drawing clear of the loop, the train stops and the guard re-sets the points. When a traffic member is in attendance the train crew is not required to carry out these operations.

Pilot Key

This is inserted in a sealed box on the departure signal and, when removed, breaks down its clearing circuit and holds it at " stop." At the next crossing loop there is a similar key. Both are stamped with the names of the stations to which they belong and can be screwed together to form one token to be used when required for token working in event of a complete breakdown of the system. If there is an obstruction the key can be removed from the departure signal and used as a token to control traffic to and from it.

Sidings

Service sidings are controlled by means of switch locks to free which and obtain access to the siding, the train must stand upon a short track section, consisting of two rail lengths marked by a post. The train can then be shunted and upon completion of the work the points are re-set to normal and locked by the switch lock. On occasions it is necessary for a train to pull into the siding clear of the main line when the points are replaced to normal and the door of the switch lock closed after the train is in clear. The signals applying to the section are then free to work in the usual way. When a train is ready to proceed from the siding, the switch lock door is opened

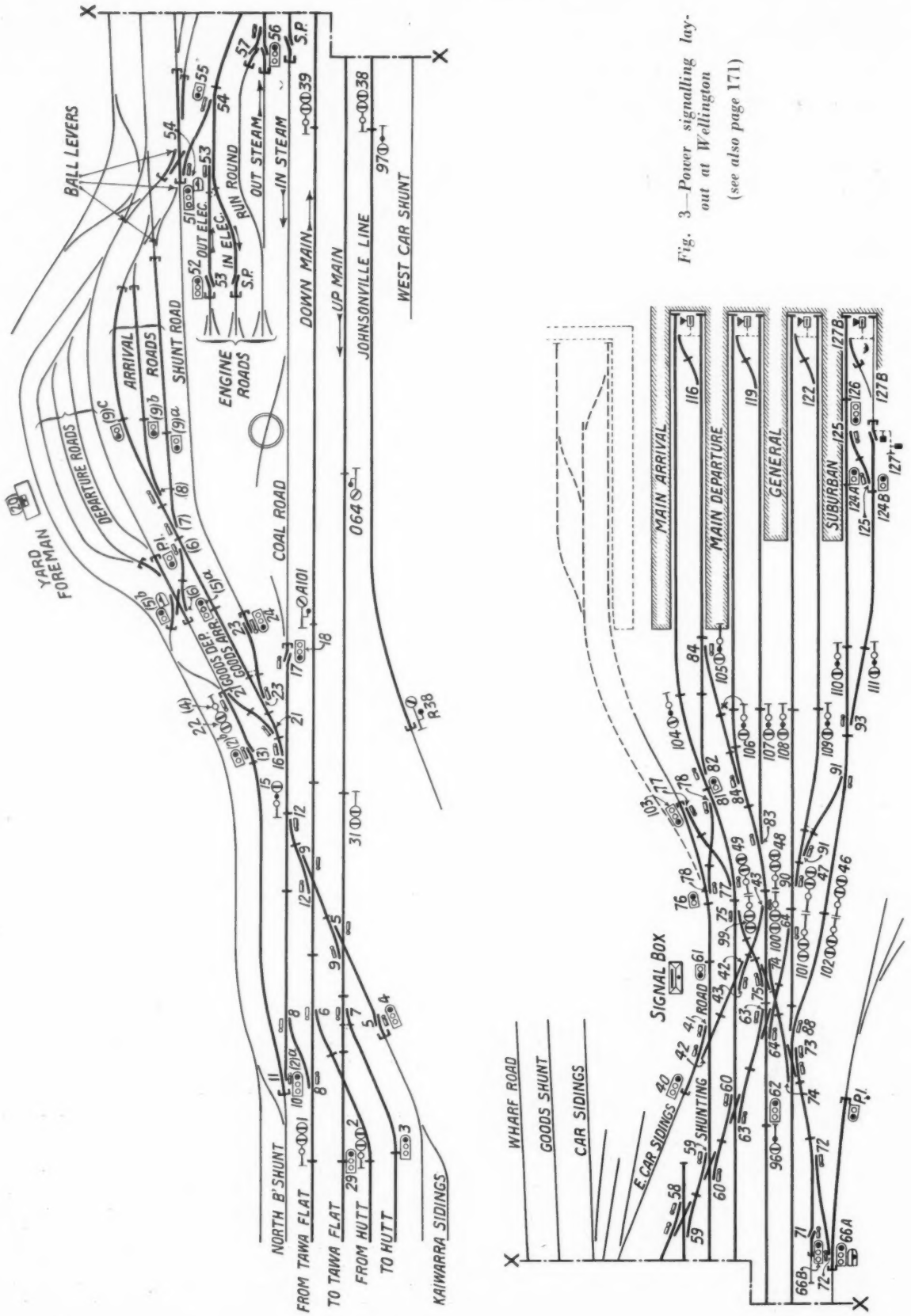


Fig. 3—Power signalling lay-out at Wellington (see also page 171)

and an indicator shows whether the section is clear or occupied; if the former, the lock can be freed and the points reversed, but if the section is occupied, the switch lock cannot be released and the train cannot proceed. The system requires four line wires. Practical experience of single line automatic signalling over a number of years has shown that working to signal indications is as safe as tablet operation.

All single line automatic sections, including all main and important branch lines, now work under the control of a train control officer, with selective telephones, considered from the first an essential adjunct. At unattended crossing stations there is a telephone signal on the station building, and when the station is called by the train control officer, an illuminated letter " T " appears. The guard or driver must immediately communicate with the train control officer, and opening the telephone door cancels the light indication. At attended stations, departure signals may be placed at " danger " in order that any train control instructions may be conveyed to the train crews. Under normal conditions trains cross in accordance with the working timetable, but the train control officer has power to alter crossing places as required, in order to expedite the traffic. The single line on the Auckland—Frankton Junction section extends from Papakura to Horotiu and over some periods of the day traffic is heavy. This section was originally worked by tablet, so it has been possible to form conclusions from practical experience regarding the relative flexibility of operation under both methods.

Trains now leave Huntly, a coal mining centre, at 2½ to 3 min. intervals nightly.

Wellington-Johnsonville Installation

This line originally formed part of the main line out of Wellington, but, with the new deviation recently constructed, is no longer required as a main line and is being electrified as a suburban line. From Wellington to Johnsonville is 6½ miles, rising from just above sea level to an elevation of more than 500 ft. with grades as steep as 1 in 36. There are seven tunnels. No intermediate signals will be provided, but the equivalent of distant signals will be, for trains approaching each crossing place. Mechanical interlockings exist at Khandallah and Ngaio and these will be switched in for shunting, the operation of signals and points being normally entirely automatic. There will be left-hand running at the three loops and the approach of a train, if the block ahead is unoccupied, will cause the loop points to reverse and the departure signals to clear. Provision has also been made so that at Ngaio and Khandallah a train travelling towards Johnsonville may be divided into two at either of these stations and the front or rear half return to Wellington while the other goes on. This will be carried out automatically without the necessity for switching in the signal boxes. For undefined shunting operations the stations will be switched in, but the shunting of multiple units to defined procedure will be automatic provided the correct sequence of operations is followed. To change this sequence local push-button controls are provided, which can be operated by the train crew for shunting multiple-units, the box being switched in for goods train shunting. At Johnsonville, provision is made for automatically operating the points so that if a train is occupying the road on one side of the platform, the points automatically set for the other side, push-button control being provided for trains leaving for Wellington. The push buttons for departing trains are located on the platform near the departure signals and an illuminated diagram is provided, additional buttons being installed for controlling movements which may be required in the yard.

The small crossing loop shown at Wadestown has merely been installed to divide the section between Ngaio and Wellington and enable a twelve-minute service to be provided.

Interlockings

Mechanical interlockings still exist in a number of places, but do not present any features of particular interest, being of the normal design and type, but the power interlockings are worthy of mention.

Fig. 3 shows the new station yard at Wellington without the goods yard facilities or connections within the engine depot. The main-line signals are three-position searchlights, with two- and three-position colour-light shunts. The yard is controlled from the main signal box with a small subsidiary interlocking frame in the yard foreman's office for certain connections in the goods yard. The main signal box is of reinforced concrete on concrete piles. The main frame has 127 levers and the subsidiary one has 12. Approach and sectional route locking are provided, the various routes clearing behind a train enabling alternative ones to be set up. Speed signalling is used, without route indicators. The illuminated diagram has a matt black background. Loudspeakers enable communication to be obtained with various points in the yard. The relay racks are located in a number of bays running at right angles to the length of the box and paper tubes are placed on the wires leading to the relay terminals on which the wire designations are printed. This has been found more convenient than fibre tags, which are, however, retained for wires leading to other terminals.

The signalling supply is a 3·3 kV. single phase ring main. A second phase feeds the automatic signalling on the Wellington-Upper Hutt line, and the third phase the Johnsonville line. Normally, power is obtained at 11,000 V and transformed in the sub-station to the lower signalling voltage, with standby petrol engine and alternator, wound with three phases completely separate, so that the machine can be unequally loaded, as a breakdown might occur on any of the three sections necessitating, however, supply of power to the other two. No. 30 crossover connects a non-interlocked to an interlocked area and although movements are required to take place from the former to the latter, shunting has also to take place in the former with provision to avoid No. 30 points being run through on a conflicting movement. No. 31 shunt signal is operated from the box and provides for trains leaving the non-interlocked area. No. 30 *WKb* is a two-position shunt signal working automatically with the position of No. 30 points and controlled by means of the key shown on the circuit diagram, while No. 30 *WKa* is an indicator which shows an arrow indicating the position in which No. 30 points are standing. Ordinary shunting movements pass No. 31 signal at " danger," provided the arrow is pointing to the right, but shunting movements from the opposite direction cannot pass 30 *WKb* if red. When No. 30 key is depressed, putting 30 *WKb* signal to " danger " and extinguishing the arrow indicator, 15 secs. must elapse before No. 30 crossover can be operated. This arrangement has been found very satisfactory (see Fig. 2, top).

The signals leading to the platform are provided with a yellow low speed light below the main signals, operated by a push button above the relevant lever in the frame and used to enable engines to shunt into occupied roads. When the route is set up the respective lever is pulled but the signal does not clear owing to the road being occupied. The push button is then used to give the low speed signal. The replacement of the lever re-sets the push button.

The outer track circuits have impedance bonds, but throughout the yard itself track circuits are single rail,

the traction drop over the rails being such that they can be operated satisfactorily. All the main trunking used in the yard is of local manufacture in reinforced concrete; small lateral trunking under tracks is timber. Sheet metal relay boxes are used. Auckland station has a 127 lever frame. The installation is electro-pneumatic using three-position, colour light signals.

It is regular practice at small power interlockings to instal the frames in the stationmaster's office, to be worked by one of the traffic staff, shunting yard connections being controlled by switch locks, which, when freed, allow hand operation of points by the shunter, who controls movements by hand signals.

These frames are frequently made to switch out, so that for through traffic with staff off duty signal operation becomes automatic.

Relay Interlocking

Several stations have been equipped with relay interlocking, designed and constructed in New Zealand. A point of interest is the provision of two keys for releasing the key locks of the siding points leading to the loop road. The controls for the signal levers consist of telephone keys with indications above. The points are controlled by rotary switches, with normal and reverse indication lights for each. All tracks are indicated on the diagram, with a buzzer signal to call attention to approaching trains.

Centralised Traffic Control

Centralised traffic control has not yet been installed, but it is to be used on a section between Taumarunui and Okahukura and a further one between Wellington and Paekakariki. A small installation has been received and it would appear that the system will have considerable application in the future.

General Remarks

Power being available at the majority of stations, the oil burning semaphore signal lamps have been converted to low voltage electric lighting in many instances; considerable extension of this will probably take place. Power is taken at 230 V. and transformed to the signal lamps at 12 V. Electric lighting of semaphores effects a considerable improvement in the visibility of signals. Track circuits have been adopted in place of facing point lock bars and as mechanical apparatus depreciates advantage is generally taken to supersede a bar by a track circuit, with its manifold advantages, providing not only an effective lock but also indicating in the signal cabin. Track circuiting at mechanical installations has also proceeded as opportunity offered, the advantage of which needs no emphasis.

Wooden pole lines are generally used for power signalling work, although old rails are used very extensively for communication lines. The timber is ironbark, grown in Australia, and is very strong, with a long life. The poles are supplied with the sap wood removed. Line wires for control circuits are for the most part 150-lb. bronze covered with indestructible braiding, while power supply lines are copper strand. Outdoor transformers are used almost exclusively, pole mounted, with isolating links, so that they may be attended to while lines are alive. Power transformers, as a rule, are oil filled.

Apparatus in Service

The following table shows extent and amount of apparatus now in service:—

Miles of single line automatic signalling	190
Miles of double line automatic signalling	78
Automatic crossing loops	33
Switch locked sidings	37
Power interlockings	32
Mechanical interlockings	94
Interlocked crossing loops	305
Tablet locked sidings	268
Tablet stations	356
Automatic telephone exchanges	6
Manual telephone exchanges	13
Miles of pole line	3,086

LOCOMOTIVE STABILITY

Diagrams showing relative positions of outside cylinders and transverse axis of centre of gravity

(*See folding plate opposite*)

AN investigation into the relative positions of the horizontal centres of gravity of various locomotives was recently made by a retired Chief Mechanical Engineer of an Indian railway. The underlying idea was that as short a horizontal distance as possible between the transverse axis of the centre of gravity and the vertical centre line of outside cylinders, would contribute to the steady running of the locomotive at relatively high speeds of 45 m.p.h. and upwards, and avoid tendency to distortion of the track. The diagrams reproduced as a folding plate with this issue, and on which the centre of gravity and centre lines of cylinders are marked, bring into comparison several different types and classes of locomotives used for passenger and freight service in this country and in India; from this it is possible to arrive at a fairly close estimate of the probable behaviour in respect of stability and track distortion of any of the locomotives. It will be noted that between many of the cases illustrated there is some consistency in the distance between the transverse axis of the gravity centre and the centre line of the cylinders. (The investigation for obvious reasons was restricted to outside cylinders alone.)

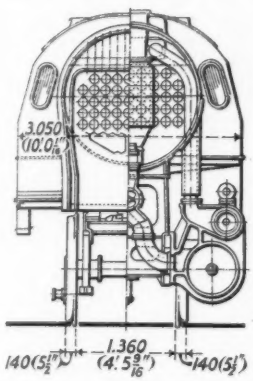
Viewed strictly from the above standpoint, the Great Western Railway "Castle" and "King" classes make a good showing in the express locomotive category, but these are four-cylinder designs with the outside cylinders set well back. Where there are only two (outside) cylinders, the average horizontal distance between the centre line of the cylinders and the centre of gravity is, in the cases cited, in the order of 13 ft., three-cylinder locomotives ranking somewhat higher.

In this connection, in the case of high-powered locomotives, the use of three or four cylinders, having the outside pair located as far back as practicable, would probably contribute to the desired result, instead of the use of two outside cylinders of large diameter at a considerable distance from the horizontal centre of gravity.

NEW 2-10-0 HEAVY FREIGHT LOCOMOTIVES FOR THE TURKISH STATE RAILWAYS

Built by the firm of Henschel & Sohn, Kassel. In the interests of economy, many of the components are the same as in 2-8-2 express locomotives ordered at the same time

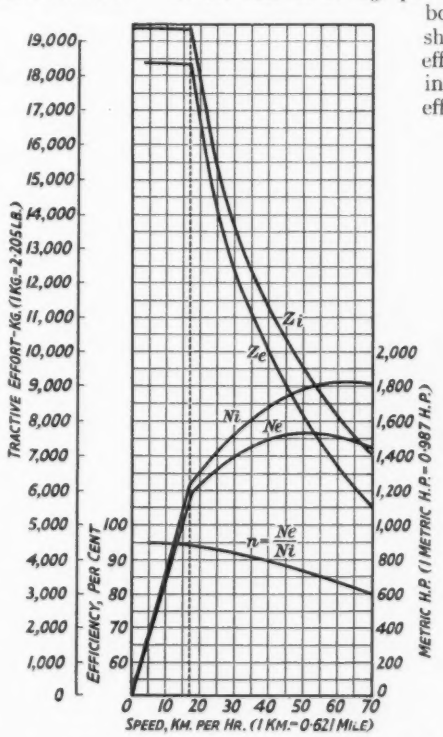
THE greatly increased volume of traffic in Turkey during recent years and the demand for improved and extended railway services have resulted in important additions to the locomotive stock of the Turkish State Railways. In 1936, the firm of Henschel & Sohn, Kassel, was entrusted with the preparation of designs for two-cylinder superheated locomotives, one class with the 2-10-0 wheel arrangement for express service at speeds up to 70 km. (43·5 m.) p.h., the other with the 2-8-2 or 4-8-0 wheel arrangement for express service at speeds up to 100 km. (62·1 m.) p.h. In both cases, the boiler working pressure was specified as 15 atm. (213 lb. per sq. in.), maximum axle load 18·5 metric tons (18¼ tons), maximum gradient 1 in 40, and minimum radius of curve 150 m. (492 ft.). It was also laid down that the details of the locomotives should be similar to those of the corresponding classes of locomotives on the German State Railway, and that maximum simplification of renewals should be effected in the interests of economy in spares. The eight-wheeled tender was to have a water capacity of about 29 cu. m. (6,380 gall.) and a coal capacity of 8 metric tons (7¾ tons). It was to be designed so that the bogies of the tenders of the existing Turkish State Railways 2-10-2 locomotives could be used for the new tenders without alteration. The total wheelbase of locomotive and tender in both classes was to be such that they could use 20-m. (65 ft. 7 in.) turntables, and the specifications also provided for the braking equipment, feed water heaters and other auxiliaries mentioned below.

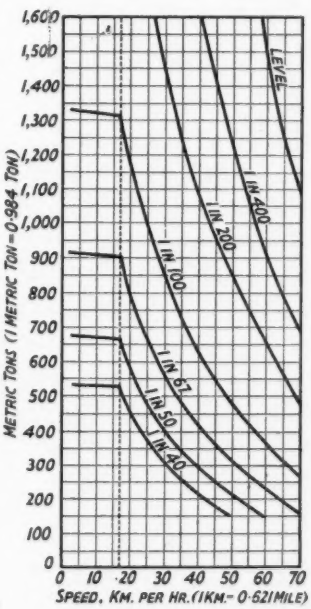


The designs were duly approved, and orders were placed for three 2-8-2 express and two 2-10-0 goods locomotives, all of which were delivered during February and March, 1937. Larger orders followed for the building of further locomotives of both types, these being shared by Fried. Krupp A.G., Essen.

Details of the new locomotives are given by Obering. G. Heise in *Henschel-Hefte*, 13/1937, the information here presented relating mainly to the 2-10-0 freight locomotive, but including various comparisons with the 2-8-2 express locomotive, with special reference to the important extent to which the same components have been embodied in both designs. The specified maximum speeds required the use of coupled wheels of 1,450 mm. (4 ft. 9$\frac{1}{16}$ in.) diameter in the freight locomotive and 1,750 mm. (5 ft. 8$\frac{7}{8}$ in.) in the express locomotive. This fact, coupled with the desire to use the same boiler for both locomotives, compelled the adoption of the 2-8-2 wheel arrangement for the express locomotive, the dimensions of the firebox for a grate area of 4 sq. m. (43 sq. ft.) being such that the firebox had to be mounted behind the coupled axles with 1,750 mm. (5 ft. 8$\frac{7}{8}$ in.) driving wheels. The back end of the frames in the 2-8-2 locomotive is carried by a trailing axle, and the leading end by a Krauss truck of the same design as in the 2-10-0 locomotive. Both locomotives are capable of running freely on curves of 150-m. (492 ft.) radius, the 2-8-2 locomotive being given 15 mm. (4$\frac{1}{16}$ in.) play on the leading carrying axle, 30 mm. (1$\frac{3}{16}$ in.) on the first coupled axle and 80 mm. (3$\frac{1}{8}$ in.) on the trailing axle. In the 2-10-0 locomotive, the allowances are 125 mm. (4$\frac{1}{16}$ in.) on the leading axle and 30 mm. (1$\frac{3}{16}$ in.) on the first and fifth coupled axles. The flanges of the driving wheels are reduced in thickness by 15 mm. (about $\frac{5}{8}$ in.) in both instances.

The accompanying charts, based on steam generation at the rate of 57 kg. per sq. m. (11·7 lb. per sq. ft.) of boiler heating surface per hour, show (left), the indicated and effective horsepower N_i and N_e, indicated and effective tractive efforts Z_i, Z_e, and mechanical





Left: Horsepower, tractive effort, and efficiency curves. Right: Coupled-load curves at speeds up to 70 km. (43.5 miles) an hour on straight track with gradients up to 1 in 40

efficiency ($\eta = N_e/N_i$) of the 2-10-0 freight locomotive at various speeds; and, (right), the maximum coupled loads at various speeds on straight track with stated gradients.

The following table gives the principal dimensions of both classes of engines:—

TABLE I.—LEADING DIMENSIONS OF NEW LOCOMOTIVES FOR THE TURKISH STATE RAILWAYS

	2-8-2 Express Locomotive	2-10-0 Freight Locomotive
Cylinders, dia.	650 mm. (25⅝ in.)	
Cylinders, stroke	660 mm. (26 in.)	
Coupled wheels, dia.	1,750 mm. (5 ft. 8⅞ in.)	1,450 mm. (4 ft. 9 1/16 in.)
Leading carrying wheels, dia.	850 mm. (2 ft. 9½ in.)	
Trailing carrying wheels, dia.	1,250 mm. (4 ft. 1 3/16 in.)	—
Tender wheels, dia.	1,000 mm. (3 ft. 3⅜ in.)	
Boiler working pressure	16 atmos. (228 lb. per sq. in.	
Boiler heating surface, tubes and flues	207·30 sq. m.	2,230·5 sq. ft.
Boiler heating surface, firebox	15·84 sq. m.	170·4 sq. ft.
	223·14 sq. m.	2,400·9 sq. ft.
Boiler heating surface, superheater	105·75 sq. m.	1,137·9 sq. ft.
Total	328·89 sq. m.	3,538·8 sq. ft.
Grate area	4 sq. m.	(43 sq. ft.)
Wheelbase, rigid	3,800 mm. (12 ft. 5⅝ in.)	
Wheelbase, total engine	11,900 mm. (39 ft. 0⅛ in.)	10,300 mm. (33 ft. 9⅜ in.)
Weight of engine in working order	104·36 metric tons (102 tons 14 cwt.)	105·14 metric tons (103 tons 10 cwt.)
Adhesion weight	72·81 metric tons (71 tons 13 cwt.)	91·14 metric tons (89 tons 14 cwt.)
Tender, weight in working order	63·46 metric tons (62 tons 9 cwt.)	
Water capacity	29 metric tons (6,380 gallons	
Fuel capacity	8 metric tons (7 tons 17 cwt.)	

As seen, a number of the principal dimensions of the two types of locomotives are the same.

The standard firebox construction for the 2-8-2 locomotive is a copper inner box connected to the outside one by copper stay bolts in the usual way, but in the 2-10-0 locomotives the lower part of the sides of the firebox wrapper plate is of Kuprodur with copper-sheathed steel stays. In both cases there are provided 43 flues of 135/143 mm. (5·315/5·630 in.) dia., and 106 tubes of 49/54 mm. (1·929/2·126 in.) dia., 6,000 mm. (19 ft. 8¼ in.) between tube plates. The boiler feed is effected by a Friedmann steam jet pump and a Knorr-Nielebock feed pump with Tolkien valve gear. A Siemens and Halske thermo-electric pyrometer in the driver's cab shows the temperature of the superheated steam.

The frames are of 90 mm. (3½ in.) plate. The boiler is attached rigidly at the smokebox stay, and is supported by the firebox expansion brackets and three flexible stay plates between the barrel and frames.

The locomotives have four-point support. The bearing springs of the carrying wheel set and the two leading coupled wheel sets are connected by compensating beams and form the front support. The rear support is provided in the 2-8-2 locomotive by the bearing springs of the two trailing coupled wheel sets and the trailing bissel, connected by compensating beams, and in the 2-10-0 locomotive by the compensating beams of the bearing springs of the back three coupled-wheel sets. The axleboxes of the driving wheel sets are of the Obergethmann type with auxiliary jaws. The pivot pin of the Krauss radial truck has 70 mm. (2¾ in.) side play.

Both cylinders are cast from the same pattern, right and left alike. A relief valve is fitted to each cylinder cover, and on each valve chest there is a by-pass for coasting with air-controlled valves of 120 mm. (4¾ in.) clear passage. The piston valves are of 300-mm. (11 13/16 in.) diameter run in loose sleeves with ground seating against the admission chambers and copper-asbestos packing rings against the exhaust. Standard Heusinger valve gear is fitted. The pistons and valves and their rods are lubricated by a Bosch pump driven from the rear coupled axle.

Knorr compressed air brakes are used and there is also supplementary braking. About 70 per cent. of the adhesion weight is braked, and the supplementary braking increases the ratio by a further 30 per cent. The 2-10-0 locomotives are also fitted with Riggenbach back-pressure brakes to reduce tyre wear on long down grades. In forward running, sand can be applied to all the coupled wheels by the compressed air sanding gear.

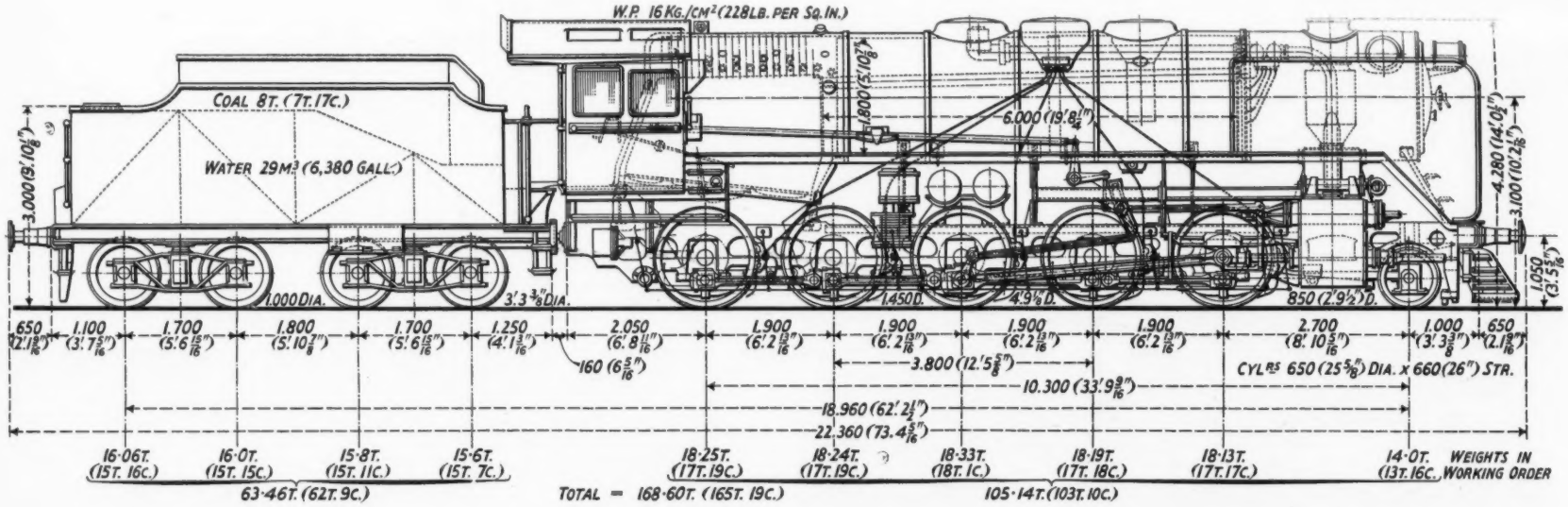
The Knorr feedwater heater is mounted transversely in the upper part of the smokebox. Condensate flows through an oil separator to the tender tank. Alfol insulation is used on the part of the firebox projecting into the cab, and on the cylinders and steam admission pipes. Steam heating equipment is provided, and a turbo-generator for lighting supply.

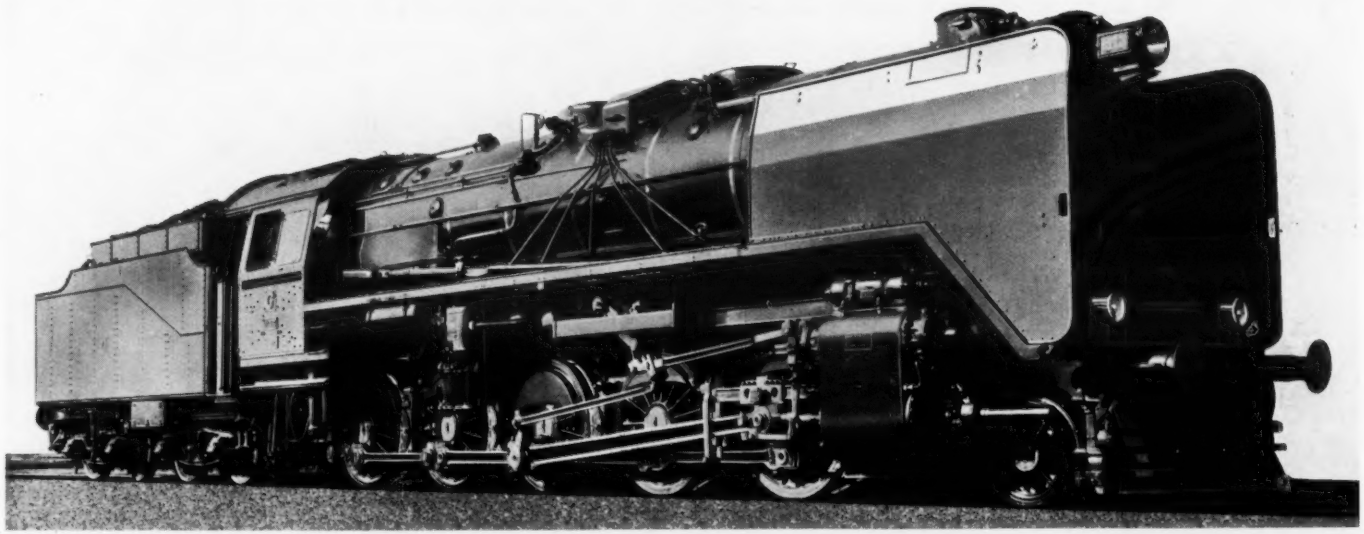
The locomotives ran on their own wheels from Kassel to Sirkedji-Istanbul, where they were ferried across the Bosphorus to Haydar-Pascha. Thence they were taken cold to the Eskischehir workshops (about 300 km. or 186 miles from Haydar-Pascha), and placed in service on the line to Ankara, specially strengthened for an axle load of 18·5 metric tons (18 tons 2 cwt. 1 qr.).

During the acceptance trials, the 2-8-2 express locomotive hauled a train of 419 metric tons (412 tons 7 cwt.) from Eskischehir to Ankara, a distance of 265 km. (164·7 miles) in 3½ hr. A speed of 110 km. (68·4 miles) p.h. was reached on the level, and 65 km. (40·4 miles) p.h. on a 20 km. (12·4 miles) gradient of 1·9 per cent. (1 in 52½) with curves of 280 metres (919 ft.) radius. The cut-off was 25-30 per cent., and the superheat in the valve chests 340° C. (644° F.).

Acceptance trials of the 2-10-0 locomotives were carried out on the Ankara-Irmak road, 184 km. (114 miles) in length, with a train weighing 504 metric tons (496 tons). Speeds of 30-35 km. (18·6-21·7 miles) p.h. were maintained on a 16 km. (9·9 mile) gradient of 2·03 per cent. (1 in 49¼) with curves of 250-m. (820-ft.) radius, the cut-off being 30-35 per cent. and the superheat 320° C. (608° F.).

C.N.R INCREASED TRAFFIC IN 1937.—Passenger traffic on the Canadian National Railways during 1937 showed an increase of 15 per cent. over 1936, according to Mr. Alistair Fraser, Vice-President in charge of traffic. By the provision of new passenger equipment all principal main-line trains are now fully air-conditioned. Freight tonnage handled improved by approximately 10 per cent.





NEW 2-10-0 FREIGHT LOCOMOTIVE, BUILT BY HENSCHEL & SOHN G.m.b.H., KASSEL, FOR THE TURKISH STATE RAILWAYS

WELDED CYLINDERS FOR 2-8-2 LOCOMOTIVES, P.O.-MIDI RAILWAY

Cylinders built entirely from plate by the Ateliers de Périgueux are used to replace defective cast-iron cylinders

*By E. MONIER, Chef Divisionnaire d'atelier aux Ateliers de Périgueux**

MANY breakages have occurred in the fixing brackets of the cast-iron cylinders of locomotives of the former P.O.-Midi Railway, Classes 141.827-141.960. These are often incapable of being repaired by oxy-acetylene or electric welding, and therefore involve premature replacement. The engines are of American construction, and the breakages are due to fatigue resulting from a defect of design in the attachment. It was therefore decided to test the practicability of building the cylinders by welding together plate components, and in order to ascertain fully the possibilities and technique of this construction and the behaviour of the welded cylinders in service, the work was entrusted to the Périgueux workshops.

Special importance is attached to making the welded cylinders strictly interchangeable with the cast iron cylinders, and to retaining the same form and dimensions in the steam passages, so that no modification would be required in any part of the locomotives. This condition has been fulfilled, with the single exception of the steam supply pipe. A quarter-scale model was first built to settle the lines of welding, their accessibility, and the sequence of operations, taking into account the available facilities for machining. Three sets of parts are built separately for each cylinder, *viz.*: (1) The steamchests and cylinders with their connecting passages; (2) box framing; (3) exhaust pipes.

The rings or barrels forming the steamchests and cylinders are welded by oxy-acetylene blowpipe, but all the other joints are arc-welded, using boiler welding electrodes in all cases, excepting the attachment of the end flanges of the cylinders, and the welding of the ribs on the latter and the fixing bracket. In these cases it is important to secure maximum strength, hence high quality forgeable electrodes are used.

Cylinder Construction

The cylinder consists of a ring of grade B steel plate 20 mm. ($\frac{25}{32}$ in.) in thickness, bevelled by an oxygen cutting torch and welded longitudinally by an oxy-acetylene

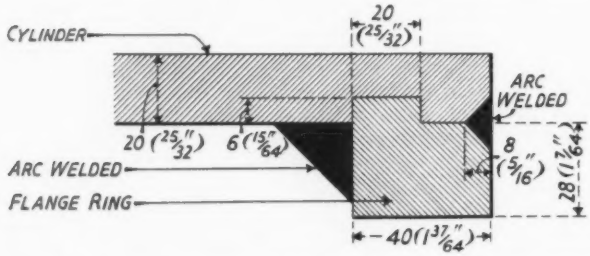


Fig. 1—Showing arc-welded joints between cylinder and end ring

burner. After being welded, the cylinder is turned externally at each end for a width of 50 mm. (approx. 2 in.) to receive two rings as shown in Fig. 3. As these rings carry the studs holding the cylinder covers, special care is needed in their welding. The next step is to cut out the ports and weld on the four ribs of 30-mm. ($1\frac{3}{16}$ in.) plate. Fig. 2 shows one of the cylinders ready for assembly with the steamchest.

The latter is formed from a ring of 15-mm. ($\frac{12}{32}$ in.) B steel plate. After being welded longitudinally with an oxy-acetylene torch, it is bored and turned externally at each

Fig. 2—Main cylinder of welded plate construction ready for assembly with valve cylinder

end prior to the attachment by welding of pieces as follows (see Fig. 3): Six rings, the interiors of which are roughed out to permit subsequent boring to the diameter of the two distributing sleeves, one at each end of the

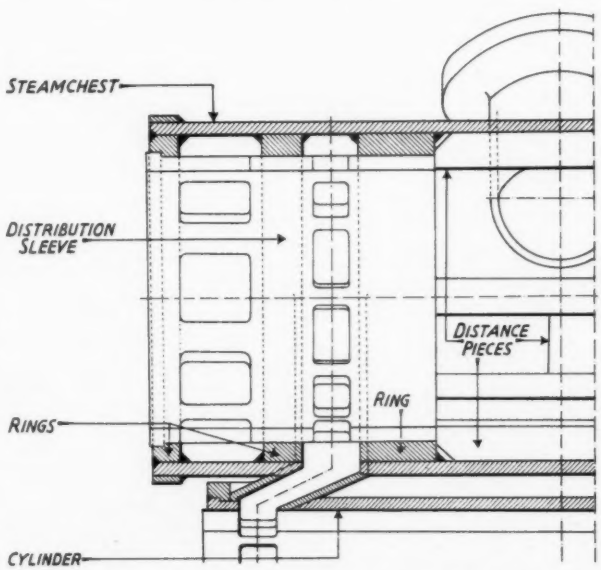


Fig. 3—Showing construction of steamchest built from welded plate component

* Reproduced from *L'Apprenti P.O.-Midi*

Fig. 4—Steamchest with ports cut and steam supply pipe welded on

steamchest, and seven longitudinal distance pieces forming a stop for the sleeves; also two end rings for the studs holding the end covers. After welding on these attachments, the ports are cut and the steam supply pipe welded in position (Fig. 4).

The steam connections between the steamchest and cylinder consist of 10-mm. (0·394 or slightly over $\frac{3}{8}$ in.) plates formed as half shells and joined in pairs by arc welding the joints.

In order to ensure parallel setting and correct distance between the axes of the steamchest and cylinder, the two are mounted in a pair of hardwood jigs as shown in Fig. 5, and steel wedges are placed at *a* and *b* to hold the cylinders securely during the welding on of the steam connections between the two cylinders. After this operation the cylinders appear as in Fig. 6.

Box-Frame Cylinder Supports

The cylinder supporting frame is in box form and consists of five main parts, viz.: the back plate of B steel,

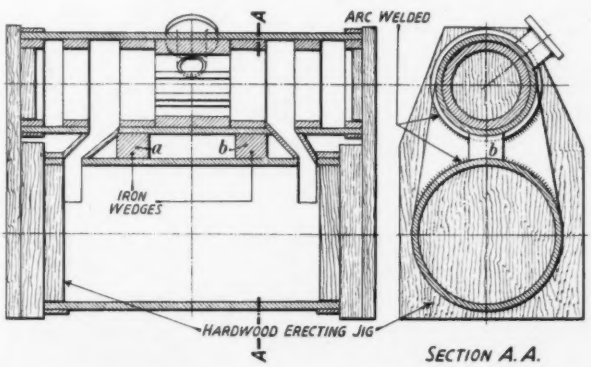


Fig. 5—Cylinder and steamchest mounted in assembly jig, ready for the attachment of the steam connections

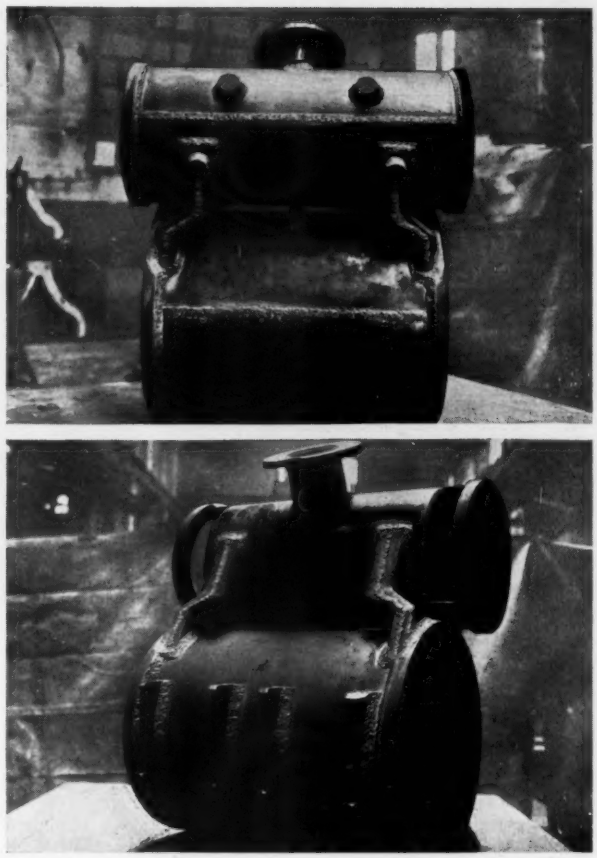


Fig. 6—Assembled cylinders and steamchests of all-welded construction as seen from both sides

30 mm. ($1\frac{31}{64}$-in.) in thickness; the bottom plate of the same material and thickness; the fixing bracket of forged B steel; and the front and rear ends of 15-mm. ($\frac{19}{32}$-in.) plate. These pieces are assembled by electric welding, with the addition of numerous reinforcing gussets.

Most of the welds being between the bevelled edges of plates not in the same plane, it was recognised that points of contact must be provided between the plates at intervals (about every 300 mm. or $11\frac{13}{16}$-in.) in order to avoid, as far as possible, deformation due to contraction (Fig. 7). After the main welds have cooled, the contact bosses are chipped out and the cavities filled by welding.

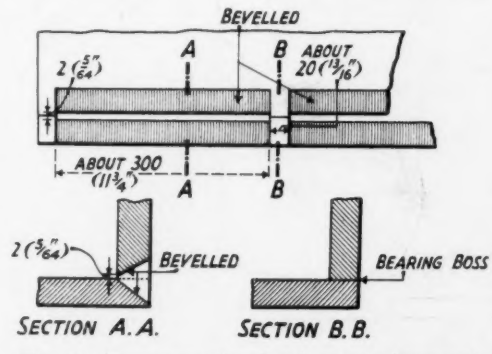


Fig. 7—Temporary bearing bosses (subsequently replaced by welds) prevent deformation of angle-joints by shrinkage

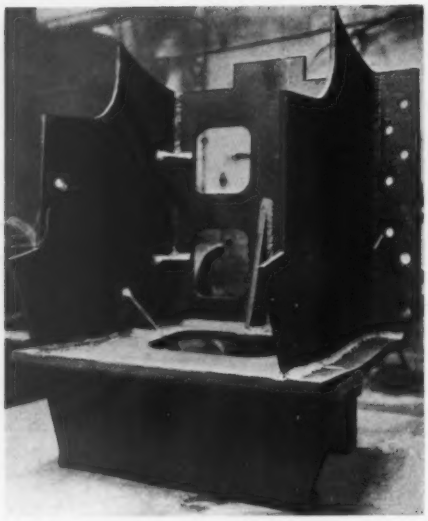


Fig. 8 (left)—Welded box-frame support

Fig. 9 (right)—Exhaust steam pipe built by arc-welding sheet metal parts

Before being welded to the bottom plate of the box frame, the fixing bracket is fully machined, except for the bearing surface for attachment to the main frame of the locomotive; this surface is rough machined, with an allowance for finishing. The fillet welds of the fixing bracket on the lower wall are reinforced by five 60-mm. (nearly $\frac{3}{8}$-in.) spot welds. Fig. 8 shows the completed support.

As the planers in the Périgueux shops are not capable of machining, with the cylinder in place, the face of the fixing bracket for the locomotive frame and the seating for the support of the front compensating beam on the bottom plate, the boxing had to be marked out and the parts mentioned planed before proceeding further.

Mounting Cylinders and Exhaust Pipes

The exhaust steam pipes, of Y-shape, are built up by arc-welding together six pieces cut from 8-mm. ($\frac{5}{16}$-in.) sheet metal. A blade piece guides the steam flow at the junction of the two branches of the pipe. The completed pipe is illustrated in Fig. 9.

In mounting the cylinders in their supporting frame it is essential to establish accurately, in accordance with the drawings of the locomotive, the distances A, B (Fig. 10) between the centre lines of the steamchest and cylinder, and the back plate of their supporting box-frame, allowing for 2 mm. ($\frac{5}{64}$-in.) contraction after welding; also, the vertical distance C between the centre line of the driving cylinder and the seating of the fixing bracket on the frame.

The arrangement used for this purpose is shown in Fig. 10. Bearing bosses forming points of contact between the parts are provided at D, E, F, G, to reduce contraction to a minimum, and the welds are made in the following order: bottom plate of box-frame to driving cylinder; front and rear ends of boxing to the steam pipes between steamchest and driving cylinder; four ribs on the fixing bracket; and four ribs on the bottom plate of the box-

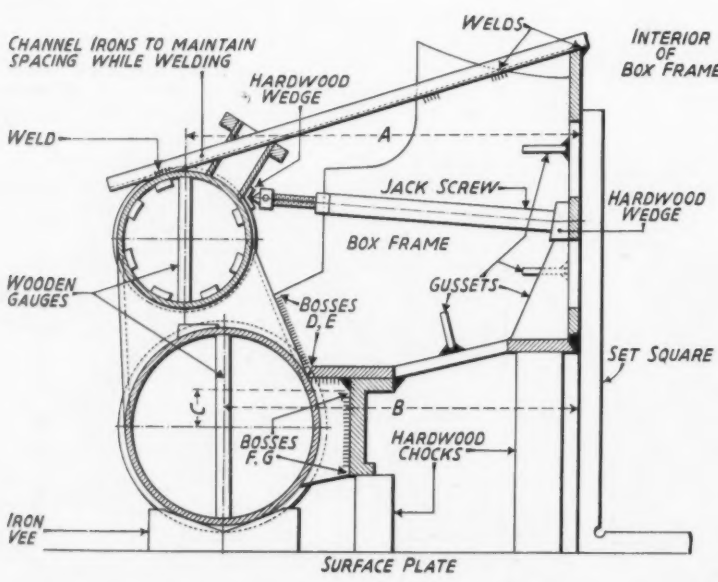


Fig. 10 (left)—Cylinder, steamchest, and supporting frame mounted ready for welding

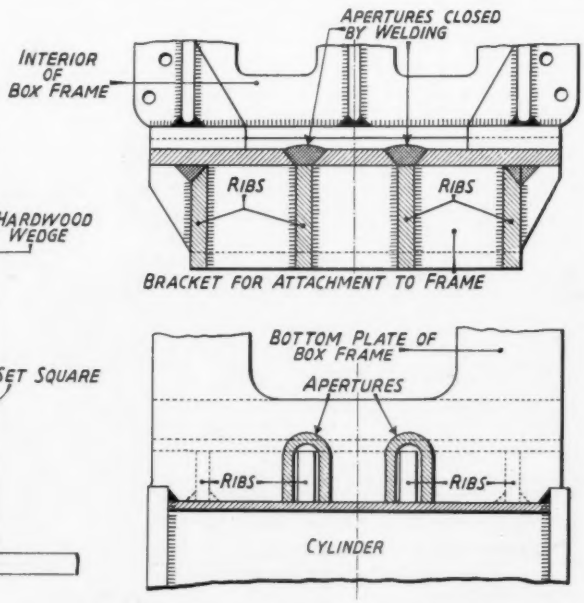


Fig. 11 (right)—Showing method of welding ribs to fixing bracket and lower plate of cylinder boxing

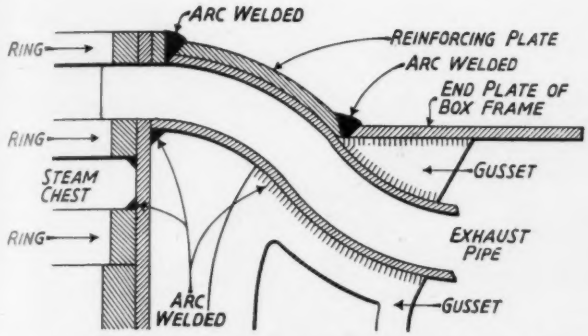


Fig. 12—Reinforced and gusseted connection between end of cylinder boxing and steamchest

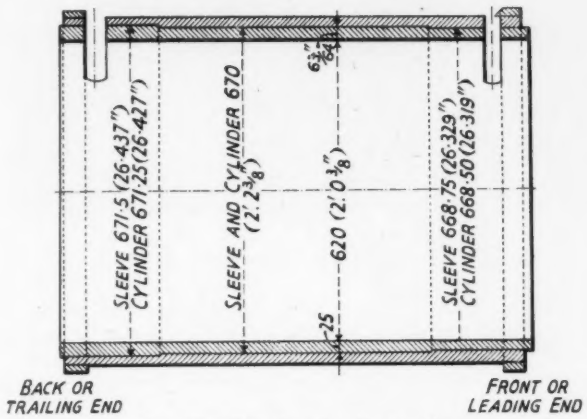


Fig. 13—Details of cylinder liner

frame. In order to permit the welding of the two middle ribs, apertures are cut in the lower plate of the box-frame and closed by welding, as indicated in Fig. 11.

No difficulty is experienced in putting the exhaust pipes inside the cylinder boxing between the steamchest and the back plate, and then welding them to these two parts. Connection between the front and rear (leading and trailing) end plates of the boxing and the steamchest is established by a 10-mm. (about ⅜-in.) reinforcing plate, with gussets to consolidate the whole, as shown in Fig. 12. The top of the box framing is then closed by a 15-mm. ($\frac{19}{32}$-in.) plate, welded on to the steamchest and the end plates of the boxing.

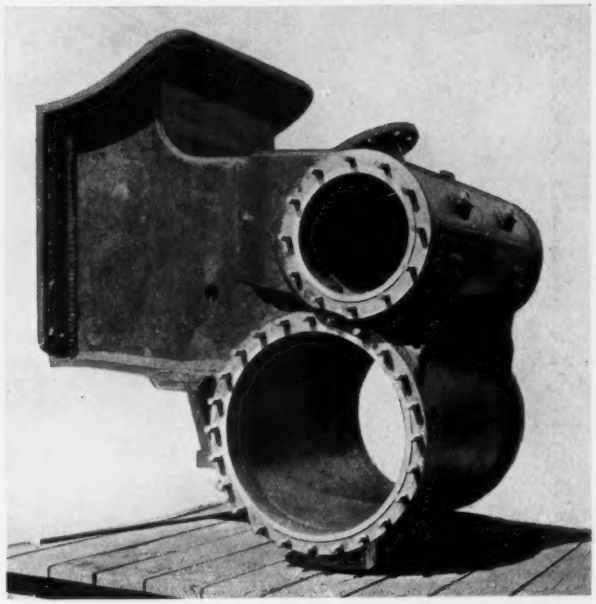


Fig. 14—Completed cylinder and steamchest, studded and tested hydraulically

Finally, the cylinders and steamchests are marked out, drilled and studded; bored by a Dyle and Bacalan portable machine; and fitted with their cast-iron liners. The drawing, Fig. 13, shows details of the cylinder liner, which is inserted from the trailing end. A hydraulic pressure test is now applied, 4 kg. per sq. cm. (56·9 lb. per sq. in.) for the exhaust pipes and 20 kg. per sq. cm. (284·5 lb. per sq. in.) for the combination of steamchest and cylinder with the exhaust pipes shut off, these not being built to withstand such a pressure. The completed construction is shown in Fig. 14, studded and tested, the plate forming the cradle for the reception of the boiler being laid on top of the box frame.

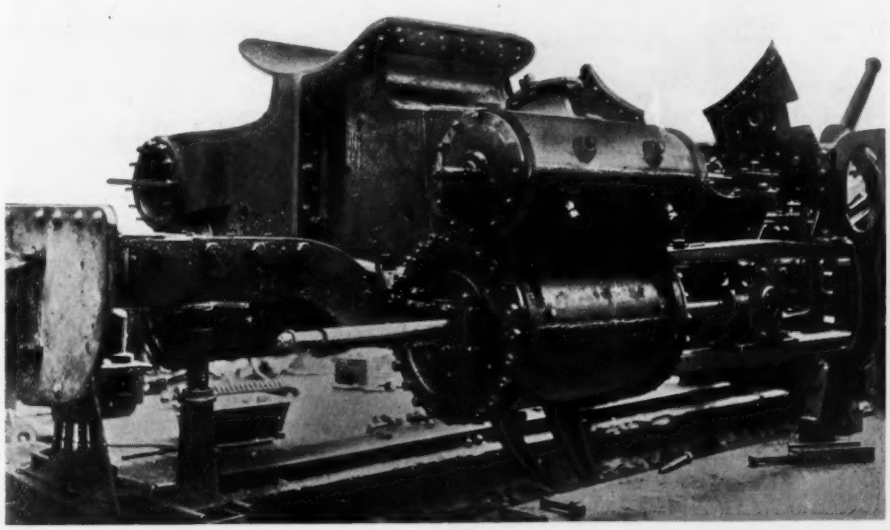


Fig. 15—Welded cylinders, cylinder boxing, and smokebox carrier in position

As there is no boring machine in the Périgueux shops capable of machining the 25-mm. (1-in.) plate forming the smokebox cradle, after welding it to the cylinder box-frame, the following procedure is adopted: The group of cylinders is mounted on the locomotive frame, and the boiler, with the bottom of the smokebox replaced, is mounted on the frame and adjusted accurately to height. The cradle plate, drilled and shaped approximately to the radius of the smokebox, is slid between the

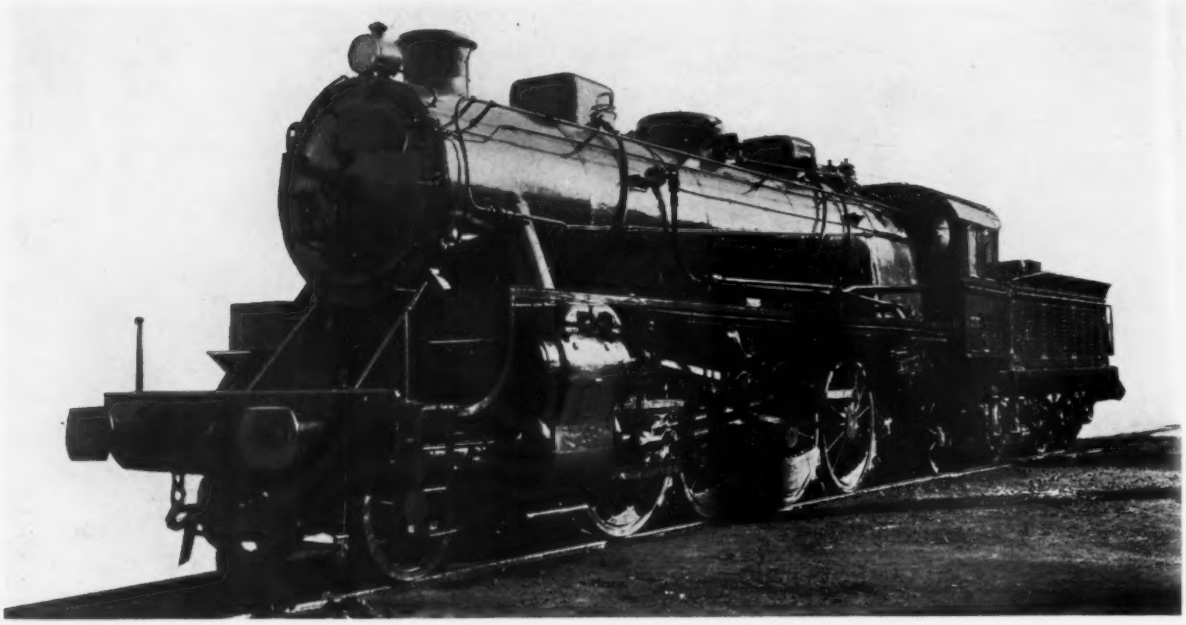


Fig. 16—Locomotive No. 141.918, P.O.-Midi Railway, with welded cylinders

cylinder box-frame and the boiler and fitted exactly to the smokebox ring by means of bolts and the application of a heating torch. The cradle plate is then tack-welded to the cylinder box-frame. At the same time, the opportunity is taken of levelling and adjusting the seating of the blast-pipe, which is welded to the cradle plate, the exhaust pipes and the back plate of the cylinder boxing. The boiler is then removed, the cylinders are detached, and the welding of the cradle plate on the cylinder boxing is completed.

Service Trials

A set of welded cylinders built as described above was fitted to locomotive 141.918 of the P.O.-Midi Railway without any difficulty, and the regulation trials of the locomotive were completed without incident on August 24, 1935. In order to test the stability and smooth running of the cylinders under load, a traction test was then carried out with a train of five locomotives coupled together, when slipping of the wheels was caused purposely. This trial, also, was passed successfully, and locomotive No. 141.918 has since been in regular service from the Angoulême depot without any trouble arising from the cylinders. Up to date, the total run of this locomotive provided with welded cylinders is 78,000 km.

So far as the author is aware, this is the first set of cylinders built by welding in France. Special expenditure was required on jigs and other equipment, and on a certain amount of experimental work in developing the technique. Nevertheless, the cost of the finished cylinders was less than that of cast steel cylinders, and no doubt a yet lower cost could be reached in regular production, intermediate between the cost of cast steel and cast-iron cylinders.

The Rigi Railway

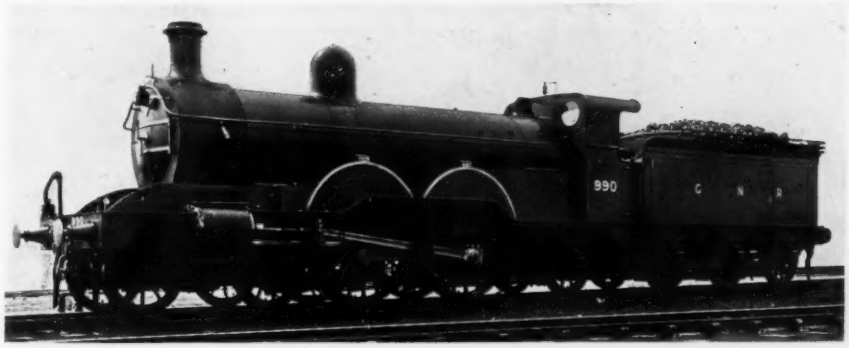
A view at the summit of the Rigi Railway before electrification, for which we are indebted to "The Traveller's Gazette" of Thos. Cook & Son, Ltd. The track on the left is used by trains of the Vitznau-Rigi line, and that on the right by Arth-Rigi trains. The electrification of the former was described in our Electric Traction Supplement of November 12 last, and the peculiar ownership of the summit section in our issue of December 10

ADDITIONS TO YORK RAILWAY MUSEUM

The G.N.R. Atlantic locomotive "Henry Oakley," and an early C. & S.L.R. tube coach

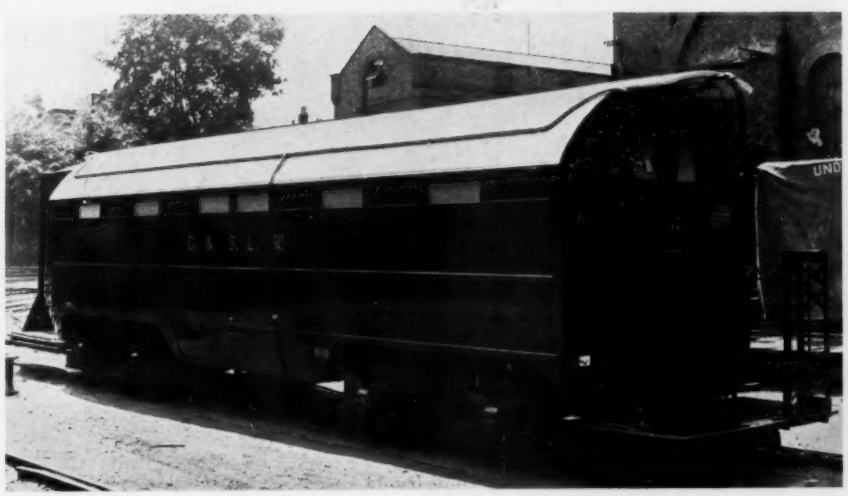
MR. WILLIAM WHITELAW, the Chairman of the L.N.E.R., Sir Murrough J. Wilson, Deputy Chairman, Major W. H. Carver, M.P., Sir William Gray, Sir Charles Batho, Sir Ronald Matthews, directors of the L.N.E.R., and others, on Friday morning last, January 21, made an inspection of two interesting exhibits which were later in the day added to the collection at the York Railway Museum. One was the pioneer Atlantic type locomotive to run on British railways. This engine, which has been presented to the museum by the L.N.E.R., appeared from the Great Northern Railway works at Doncaster in 1898 and was the first of the "990" class introduced by the late Mr. H. A. Ivatt. The locomotive was subsequently named *Henry Oakley*—after Mr. (later Sir) Henry Oakley, General Manager of the G.N.R. 1870-98. It was withdrawn from traffic after nearly 40 years of service on November 23 of last year and is now being preserved as marking a stage in locomotive development in this country. *Henry Oakley* has been repainted and, as may be seen from the illustrations, restored practically to its original appearance. The second exhibit, presented to the museum by London Transport, is one of the early City & South London Railway trailer cars, placed in service in 1891. It is 32 ft. long, 8 ft. 4 in. high, with accommodation for 32 passengers seated longitudinally. The car is one of the gate-entrance type, with very small windows.

Above: Mr. William Whitelaw and Sir Murrough Wilson inspecting the "Henry Oakley" before it was formally deposited in the York Railway Museum



Left: The "Henry Oakley" as originally built

Below: Trailer car No. 10 of the City & South London Railway



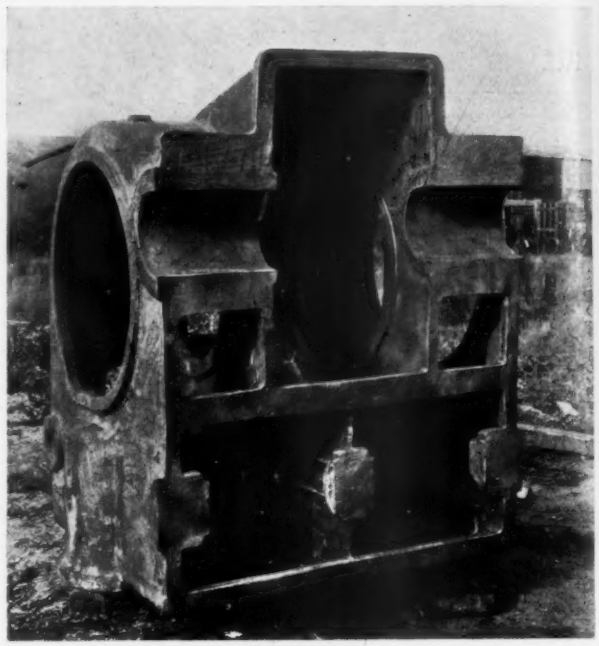
STEEL CASTINGS FOR RAILWAYS

These are produced in large quantities in an up-to-date foundry at Letchworth, Herts

WE recently visited the works of Kryn & Lahy (1928) Limited, at Letchworth, Herts, and were afforded facilities for making an inspection of the various activities there in progress. Considerable changes have occurred in these works since our visit a year or so ago, and it is stated that the output of carbon steel castings is now among the largest in the country. Approximately 40 per cent. of this output is for railway work, consisting mainly of wheel centres and other locomotive castings.

The main foundry building comprises a number of bays, each rather more than 700 ft. in length, adjacent sections including pattern shops and stores, also compressed air, oxygen, and acetylene generating plants. Many of the castings are supplied already machined, and this work is carried out in large and fully equipped shops adjoining the foundry building; one section is devoted to the manufacture of air and gas compressors, also steam and internal combustion engines—products of the associated company, J Browett Lindley (1931) Limited.

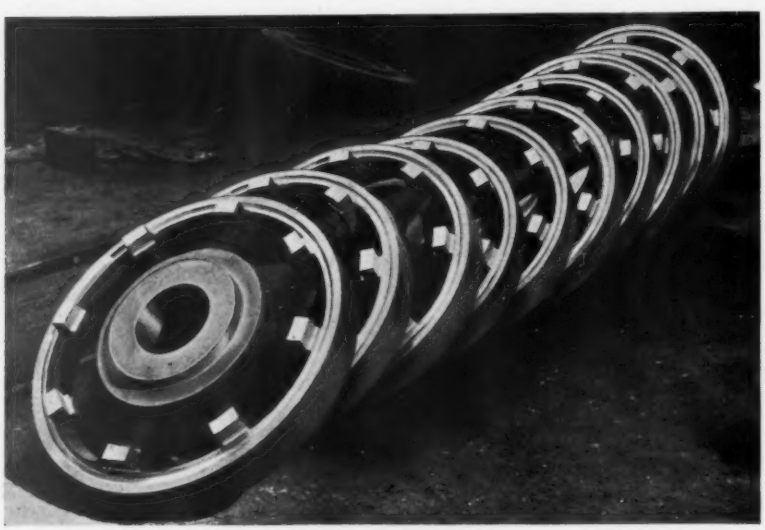
The firm's steel castings are manufactured from high quality steel scrap and pig-iron, stocks of which are maintained in the scrap yards adjacent to the melting plant, and we noted with interest that a large proportion of this scrap comes from railway rolling stock and rails, so that in point of fact material which originally gave service in this form, may now actually give further service as part of the latest streamlined trains. In the melting and finishing departments, work was seen in progress for all the home railway companies, also a large number of Majex automatic couplers for British-owned railways overseas. One exceptionally large locomotive order, on the point of completion, comprised all the castings for 227 4-6-0 type mixed traffic locomotives with tenders, built by Sir W. G. Armstrong, Whitworth (Engineers) Limited for the L.M.S. Some idea of the magnitude of this undertaking may be gained when it is realised that on every engine there are 73 types of castings ranging from a few pounds in weight up to 1¼ tons, and that the total weight was 4,500 tons. Orders for the London Passenger Transport Board included the whole of the cast steel wheel centres for new trains to be introduced on various sections of the Underground system.



Cast steel crankcase for railcar on Egyptian State Railways

The chief grades of steel manufactured at the foundry of these works are to the British Standard Specifications for railway rolling stock for general castings and wearing surfaces. In general castings, a minimum tensile strength of 26 tons per sq. in. is required, together with a minimum elongation of 20 per cent., and a cold bend test to an angle of 120 deg. For wearing surfaces a tensile strength between 35 and 40 tons per sq. in. is required, with a minimum elongation of 15 per cent. to 10 per cent. respectively. No bend test, however, is normally demanded for this grade, as ductility must always be sacrificed in a steel casting at the expense of tensile strength.

It is of interest to note that a special steel has been developed by Kryn & Lahy (1928) Limited, to which has been given the name of K. L. Stronger Steel. This material has the tensile strength of wearing surface steel together with the ductility of mild steel; namely, a minimum elongation of 20 per cent. on the tensile test, with a cold bend test to an angle of at least 120 deg. without fracture. The firm guarantees these results, which indicate an increase of 40 per cent. in strength over the existing British Standard Specification. The London Passenger Transport Board has been able to design the cast steel wheel centres for its new rolling stock with lighter sections than in the past, by specifying this material.



Lightweight wheel centres, part of a large order in hand for new London Underground trains

General view of moulding bay in the steel foundry at Kryn & Lahy works

Finishing locomotive driving wheel centres

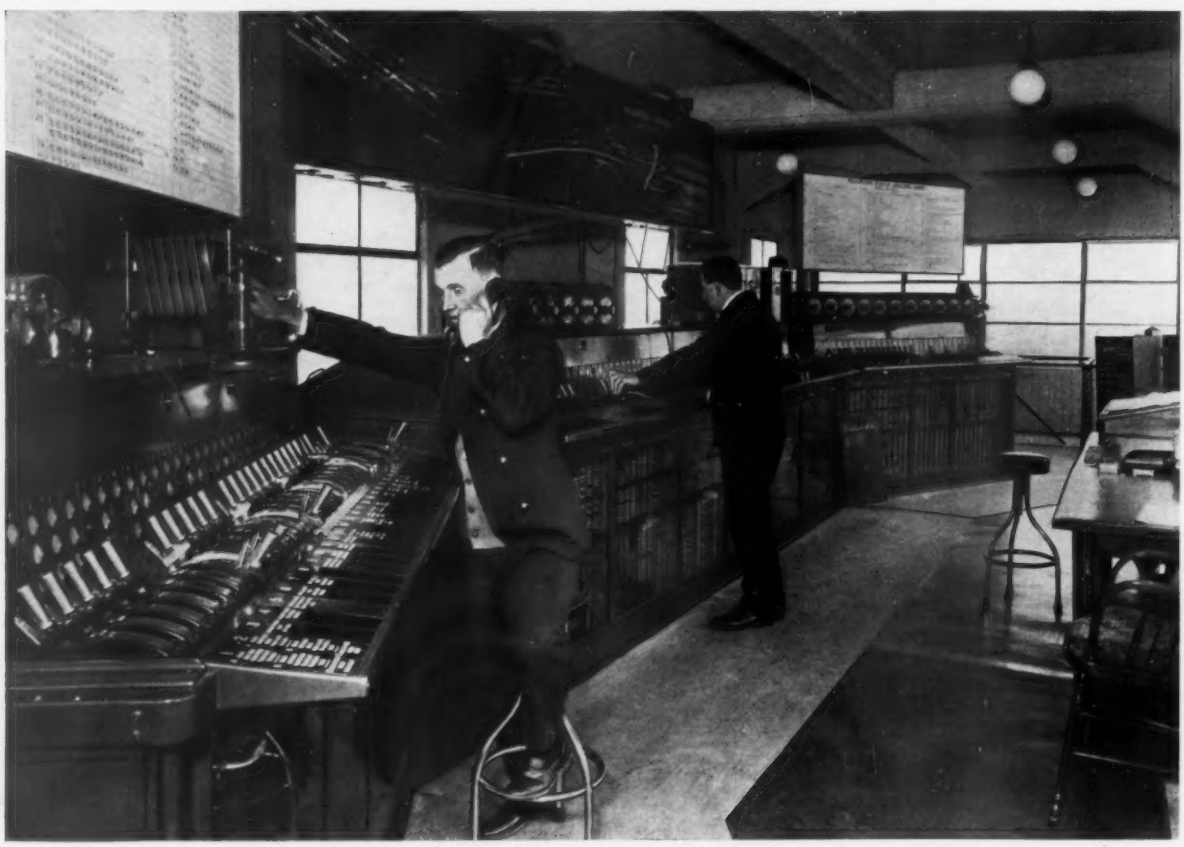
STEEL CASTINGS FOR RAILWAYS (*See opposite page*)

Moving a Station Bodily on the C.P.R.

(See page 166)

Right: The station buildings jacked up on to packings and a train of flat trucks being pushed in on a new temporary track beneath them

Left: After the station had been lowered on to the trucks and the engine and vans attached, the journey to Castor was undertaken as depicted



Interior of signal box in the yard of Wellington new station, New Zealand Government Railways
(See article on pages 169-174)

RAILWAY NEWS SECTION

PERSONAL

G.W.R. Deputy Chief Engineer

The directors have authorised the following appointment, effective from January 24:—

Mr. A. S. Quartermaine, Assistant Chief Engineer, Paddington, to be Deputy Chief Engineer, Paddington.

From *The London Gazette* of January 19: Territorial Army, Royal Engineers, Engineer and Railway Staff Corps: Major George Ewart Rhodes, M.Inst.C.E., late R.E. (Spec. Res.), to be Major (January 19).

Mr. R. H. E. S. Rose has been appointed Assistant Traffic Officer, and Mr. J. E. Crawley, Assistant Accountant, Nigerian Railway. Mr. E. Milne has been appointed District Running Superintendent.

Mr. H. C. James has been appointed Assistant General Passenger Agent, Canadian Pacific Railway, with headquarters at Montreal. The appointment dates from February 1, and Mr. James will then be succeeded in his former position of District Passenger Agent, St. John, N.B., by Mr. C. E. Cameron.

Locomotive Testing Station Committee

As announced in a news paragraph on page 192, appointments have now been made to the Superintending Committee of the locomotive testing station which will be established at Rugby jointly by the L.M.S.R. and L.N.E.R. They are as follow:—

Chairman for 1938: Mr. A. K. McCosh, a Director of the L.N.E.R. (The office of Chairman will be held in alternate years by representatives of the two companies.)

Secretary: Mr. O. H. Corble, Assistant to the Chief General Manager and Industrial Agent, L.N.E.R.

Accountant: Mr. G. Morton, Chief Accountant, L.M.S.R.

Mr. R. C. Bond, formerly Assistant Works Superintendent, Crewe, L.M.S.R., has been appointed Superintending Engineer. He is at present engaged in making a study of the testing stations at Vitry and Grunewald and in preparing plans.

The design, construction, and management of the plant will be under the control of a management committee, consisting of the chief mechanical engineers of the two companies.

Mr. L. E. Steventon, who, as recorded in our issue of December 17, has been appointed Traffic Manager, Tanganyika Railways & Port Services, entered the service of the former London & North Western Railway as a probationer in 1914. During the war, from 1915-19, he served in East Africa and in Salonika with the Motor Machine Guns; and in Salonika and Asia Minor with the South Lancashire Regiment. Returning to railway service, he served from 1919 to 1928 with the London & North Western, and subsequently the London Midland & Scottish Railway, in the positions of District Runner and Headquarters Inspector. Mr. Steventon went overseas in November, 1928, being appointed Assistant Divisional Superintendent (Traffic), Nigerian Railway; and two years later was appointed Assistant Superintendent of the Line (Traffic) of the same system.

Mr. L. E. Steventon

Appointed Traffic Manager, Tanganyika Railways and Port Services

---

Mr. G. J. de Vos van Nederveen Cappel, Chief Signal Engineer, Netherlands Railways, retired on January 1. He entered the service of the former Holland Railway Company in 1902 in the Signal Department, and in November, 1919, nearly three years after the working arrangement between that company's lines and those of the State Railway Company had been set up, he became Signal Supervisor for the Amersfoort district. He was actively engaged in drawing-up common signal and operating regulations for the combined lines, and in May, 1925, following the sudden death of Mr. van Driel van Wageningen, was appointed head of the Signal Department. In May, 1935, heating, lighting, and general machinery were placed under his care. Many important new signal installations have been made during his term of office, such as those described in our issues of April 17, 1936, and January 1, 1937, as well as the change from the red-green-white to red-yellow-green system of lights, effected by careful organisation in a single day—July 16, 1934. Mr. de Vos received the members of the Institution of Railway Signal Engineers at Amsterdam on June 22, 1929, for their summer meeting and became an Honorary Member of that body, to which he read a paper, "Railway Signalling in Holland," on November 13, 1930.

Engineer Atanasio Iturbe, Chairman, Local Board, Central Argentine Railway, completed 25 years with that company on December 7 last. Engineer Iturbe has a long and exceptionally varied record of distinguished public service both in an executive and an administrative capacity, details of which were published in The Railway Gazette of April 28, 1933. After occupying a number of important posts, including those of Professor in the Engineering Faculty of the University of Buenos Aires, and Director and later Secretary of Public Works in the Municipality of the same city, he was appointed, in December, 1912, a member of the Local Board of the Central Argentine Railway, of which he was elected Chairman in March, 1933, on the death of Dr. José A. Frias.

The completion of Engineer Iturbe's silver jubilee with the company was signalised by a luncheon given in his honour at the Jockey Club, Buenos Aires, by the local directors, chief officers, and lawyers of the railway. Dr. Agustin N. Matienzo, Local Director,

who presided, briefly reviewed the outstanding features of Engineer Iturbe's career, and referred in eulogistic terms to the valuable services he had rendered to the Central Argentine Railway, which, for a quarter of a century, had had the benefit of his wide experience, sound judgment, energy, and administrative talents. On behalf of those present, Dr. Matienzo presented Engineer Iturbe with a handsomely fitted dressing case and other travelling accessories, together with an illuminated address bearing the signatures of his colleagues of the Local Board and the chief officers. Engineer Iturbe suitably responded.

Mr. Allan S. Quartermaine, M.C., B.Sc., M.Inst.C.E., who has been appointed Deputy Chief Engineer, Great Western Railway, graduated at University College, London, and gained the Chadwick Scholarship. After a period of training in the Hertfordshire County Surveyor's Office and at the Tees Side Bridge & Engineering Works, Middlesbrough, he joined the Great Western Railway at Wolverhampton in 1910. In 1914 he was transferred to Paddington, and in 1915 went to Egypt with the 116th Company, R.E. During the war he was on location in Sinai, and subsequently became New Works Engineer on the Palestine Military Railways; he was promoted to the rank of Major, mentioned in despatches and awarded the Military Cross. In 1920 Mr. Quartermaine was appointed Assistant Divisional Engineer at Gloucester, and returned to Paddington in 1924 as Assistant to the Joint Chief Engineers. He acted as Co-ordinating Officer with the War Office in the formation of the Supplementary Reserve Units of the Royal Engineers, and raised and commanded No. 1 Bridging Company. In 1926 he was appointed Divisional Engineer at Bristol, and in 1929, on Mr. Carpmael's appointment as Chief Engineer, Mr. Quartermaine returned to Paddington as Assistant Chief Engineer (Permanent Way and Docks), and subsequently in 1933 became Assistant Chief Engineer.

Mr. Allan S. Quartermaine, M.C., B.Sc.
Appointed Deputy Chief Engineer, Great Western Railway

Mr. A. J. Robinson, who, as recorded in our issue of December 31, has been appointed Assistant to Superintendent (Cartage), Road Transport Department, Paddington, Great Western Railway, was educated at Marlborough, and entered the service of the company in 1911 in the department of the Superintendent of the Line. After station experience, he joined up with the Middlesex Regiment, and later served with the Oxford & Bucks Light Infantry in France; he was twice wounded, attained the rank of Captain, and was mentioned in despatches. On being demobilised in 1919, Mr. Robinson had outside experience, and in 1925 was attached to the Road Transport Department as District Representative for the West of England. On the formation of the Western National Omnibus Co. Ltd., jointly owned by the National Omnibus & Transport Co. Ltd. and the Great Western Railway, Mr. Robinson was loaned to that company and held the position of Area Traffic Superintendent for Cornwall until September, 1934, when he became Junior Assistant in the Road Transport Department at Paddington. With the reorganisation of the Road Transport Department he

Mr. A. J. Robinson
Appointed Assistant to Superintendent (Cartage), Road Transport Department, G.W.R.

Re-railing tube railway track (reproduced from the menu of the London Transport Permanent Way Department dinner, reported opposite)

becomes Assistant for Cartage to the Superintendent of Road Transport. Mr. Robinson is an Associate Member of the Institute of Transport. He is an active member of the G.W.R. Lecture & Debating Society, is keen on hockey, golf, and cricket, and is a member of the M.C.C.

We regret to record the death on January 21 of Mr. C. R. Allensby, President of the Institution of Heating and Ventilating Engineers.

Mr. F. D. Evans, Director of Public Works in Nigeria and at present Acting Director of Transport during the absence on leave of Mr. G. V. O. Bulkeley, was awarded the C.B.E. in the New Year Honours.

We regret to record the death on January 17 of Mr. John R. Gray, a Director of the Scottish Motor Traction Co. Ltd., W. Alexander & Sons Ltd., the Central S.M.T. Co. Ltd., the Western S.M.T. Co. Ltd., and the Lanarkshire Traction Company.

The late Lieut.-Col. R. N. Sutton-Nelthorpe, whose death on November 17, 1937, was recorded in our issue of November 26, left personal estate valued at £81,087 (£62,690 net). He was a Director of the former Great Central Railway.

The late Mr. A. J. Brickwell, Estate and Rating Surveyor, Southern Area, L.N.E.R., whose death on December 10 was recorded in our issue of December 17, left estate valued at £8,401 (£7,230 net). Mr. Brickwell left an old blue punch bowl to the Hertford Museum, and the residue of the property upon trust for his wife for life, with remainder to Hertford Grammar School.

We regret to record the death on January 25, at the age of 60, of Sir Thomas White. He received his knighthood in 1928 for his work in connection with rating, in the course of which he became President of the Expert Valuers' Panel relating to railway assessments. Sir Thomas had been Chairman of the Mersey Tunnel Joint Committee since 1929.

It is with great regret that we record the death on January 25 of Sir Vivian E. D. Jarrad, who retired last year from the post of Agent of the Bengal-Nagpur Railway. Mr. Jarrad, whose early training was received in the Traffic Department of the Great Western Railway, joined the Bengal-Nagpur Railway as Assistant Traffic Superintendent in 1903, and was appointed Agent in 1929. In October last he was appointed a Director of the South Indian Railway Company, and received his knighthood in the Coronation honours.

London Transport Permanent Way Department's Annual Dinner

(*See illustration opposite*)

The Permanent Way Department (Railways), L.P.T.B., held its second annual dinner at the South Kensington Dining Club on January 19, Mr. K. Brinsmead presiding. There was a record attendance of staff, and the guests included representatives of the main-line railways and of other departments of the board. Among those present were:—

Messrs. J. Briggs (L.M.S.R.); H. Carter (Building Superintendent, L.P.T.B.); H. W. Clark (Steelwork Section, L.P.T.B.); G. Curry (Resident Engineer, Central Line Realignment Works, L.P.T.B.); R. Dell (Assistant Signal Engineer, New Works, L.P.T.B.); D. F. C. Fitzgerald (Consulting Engineers—Sir Harley Dalrymple Hay); B. P. Fletcher (District Engineer, L.N.E.R.); E. Graham (Mechanical Engineer, Maintenance, L.P.T.B.); J. C. Martin (Civil Engineer's Department, New Works, L.P.T.B.); J. H. Harley-Mason (New Works Engineer, L.P.T.B.); J. W. Melville (L.M.S.R.); R. F. Morkill (Assistant Signal Engineer, Maintenance, L.P.T.B.); C. F. Tofts (Arthur Balfour & Co. Ltd.); A. S. Young (Northern Divisional Engineer, Permanent Way Department, Tramways, L.P.T.B.).

Mr. V. A. M. Robertson (Chief Engineer) proposed the toast of "The Permanent Way Department," and spoke appreciatively of the excellent work carried out by the department during the past year. He also referred to the heavy programme of new works which lay ahead of the department during the next 18 months or so, and he was quite confident that these would be executed in the same efficient manner as in the past.

Mr. W. A. Conisbee (Chief Clerk, Permanent Way Department) replied to the toast, and in a most entertaining speech referred to the happy relations which existed between the technical, supervisory, and clerical staff in the department.

Mr. J. H. Condy (Civil Engineer, Maintenance) responded to the toast of "The Guests," proposed by Mr. H. C. P. Havers (Divisional Assistant, Permanent Way Department), and made reference to the absence of Mr. Arthur R. Cooper, late Chief Engineer of the board, who was unable to be present with them. Mr. Cooper had sent him a message, hoping they would have an enjoyable evening and wishing them all prosperity in the future. Mr. W. A. Willox, also responding to the toast, referred to the unique safety record of the L.P.T.B. and its predecessors and expressed his appreciation of being among permanent way men again.

"Selling Transport"

"Southern Sales" Scheme Principal Topic at S.R. Western Divisional Annual Dinner

The new Southern Sales scheme, by which it is hoped to increase the revenues of the company, was referred to at the annual dinner of the staff of the Southern Railway Western Division, held at Exeter on January 22. The chair was occupied by Mr. C. F. de Pury, Divisional Superintendent, and among those present were Mr. E. J. Missenden, Traffic Manager, and Mr. R. M. T. Richards, Assistant Traffic Manager.

Mr. E. E. Northcott, Goods Agent, Exeter, in submitting the toast of the "Directors and Officers," referred to the extensive improvements that had taken place during the last few years in all branches of the company's business. In alluding to the Southern Sales scheme, Mr. Northcott said its inception had been largely due to Mr. Missenden, and he assured the Traffic Manager that they in the West of England would do their best to attain the figure set as their objective.

Mr. E. J. Missenden, in reply, said that the Western Division served a fine part of the country that had not suffered from the depression, and he felt sure they would make a success of the Southern Sales scheme. He thanked the Western Division staff for the way they had done their jobs, and mentioned that during the 16 months in which he had held his present position, he had not received a single complaint from the public in that part of the country. Congratulating Mr. de Pury on the way in which he had controlled the destinies of the Western Division, Mr. Missenden declared that in his considered judgment he had carried out that function with great distinction. In thanking the rest of the staff, Mr. Missenden mentioned that over three million tickets were collected from the Western Division last year. Of that total, 1¼ millions were during the months of July, August, and September, and on one particular Saturday at Waterloo, 6,660 seats were booked for the West of England.

Mr. J. D. Atkins proposed the toast of "The Chairman," and in response Mr. de Pury thanked his staff for their loyalty and support. He said he was confident that his division would be second to none in the race for championship honours in "Selling Southern."

RAILWAY AND OTHER MEETINGS

Bengal & North Western Railway Co. Ltd.

The ordinary general meeting of the Bengal & North Western Railway Co. Ltd. was held at Winchester House, Old Broad Street, E.C., on January 25, Lt.-Col. T. Gracey, R.E., Chairman of the company, presiding.

The Managing Director (Sir James Williamson) read the notice convening the meeting and the reports of the auditors.

The Chairman, in moving the adoption of the report and accounts, said that gross earnings of the joint undertaking amounted to just over 395 lakhs of rupees, an increase over last year of over Rs. 25 lakhs. On the company's line the gross earnings increased by Rs. 11 lakhs, and on the Tirhut line by Rs. 14 lakhs. The continued increase in coaching traffic was very satisfactory; the number of passengers carried increased by over two million and the total coaching receipts by nearly 10 lakhs. The improvement, mostly in the second half of the year, was mainly due to better attendances at melas, and coolie traffic *via* Katihar.

Goods traffic showed an increase of some 79,000 tons lifted, with an increase of over 12 lakhs of rupees in receipts, principally due to the improved sugar and rice traffic; on the other hand, there was a considerable decrease in the carriage of sugar-cane, grain and pulses. The decrease in the carriage of sugar-cane had been foreseen, and it was likely to continue still further as " zoning " and other steps to regulate the sugar industry became operative. But they thought that wagons so released would be available for better paying traffic, and the decrease in sugar-cane traffic was not a subject to be unduly concerned about.

With the increase of gross earnings, train-mileage, and consequently working expenses, likewise increased, but the latter was also affected by the general rise in the costs of material of all descriptions, which, it was expected, would have even a greater influence on the working expenses of the present year. Costs of new plant, material of all descriptions and the innumerable general commodities required for the operation of a railway had all increased in price by 25 per cent. or more, and their information was that there would probably be an advance in coal prices.

Working expenses during the year increased by about 12¼ lakhs, mainly accounted for by heavier renewal of locomotives, rebuilding coaching stock, and the relaying of the main line with heavier rails, a programme of necessary works spread over a period of years, which was in progress. The percentage of working expenses to gross earnings rose from 43·65 per cent. to 44·04 per cent., which could not be considered high.

The company's share of the net earnings as shown in the net revenue account amounted to £949,660, being £49,472 more than last year. After adding the gain by exchange over the book rate of 1s. 6d. per rupee amounting to £5,358, and making the necessary adjustment for taxes, payment of interest on debenture and preference stocks, interim dividend and bonus, and providing as usual the £35,000 for the sinking fund, the amount to be dealt with was £372,736. From this the board recommended the payment of a final dividend of 7 per cent. together with a bonus of 3 per cent., making for the whole year a total dividend and bonus of 18 per cent., the same as last year. The carry-forward would then be increased from £93,608 to £113,986.

The liability of the company to the Industrial Profits Tax (National Defence Contribution) was under consideration by the Inland Revenue Authorities and until their decision was known nothing could be said on this matter except that the possible contribution had been provided for in the accounts. The board was placing another £1,000 to the credit of the compassionate fund, which was unduly depleted. The Rohilkund & Kumaon Railway had also subscribed £1,000, as its staff in India had been amalgamated with the Bengal & North Western Railway staff since July, 1924, and had benefited from this fund.

Shareholders were being asked to earmark a further sum of £6,000 from the existing contingency fund to be added to the sum of £30,500 already set aside for the London staff contingency compensation fund in 1931. Since that fund was formed the rates of interest on which annuities to the staff were calculated had fallen greatly and the former sum required to buy annuities on the same scale was now inadequate.

Rainfall during the monsoon was generally well distributed and not heavy or continuous enough to cause heavy floods or any material damage except on the Tirhut Railway, where the Kosi River, which since the commencement of this century had slowly but surely been encroaching ever further to the west, laying waste great tracts of country and destroying many miles of Tirhut State Railway lines, had now strongly invaded the locality of Bhaptiahi. Severe damage was caused to the railway between Parsarma and Nirmali, over a distance of 33 miles, interrupting through communications. The policy followed in the past when dealing with the ravages of this river would be applied; rail connection being maintained by substituting temporary bridges, diversions and lines for those destroyed, further developments being awaited.

In past years mention had been made of the company's proposal to bridge the main line between Sonepore and Chupra as a means of equalising flood levels on each side of the railway, so that there would be no inducement for villagers to cut the embankment, which during high floods had to be prevented by a strong force of police. The scheme had now been accepted by the Government of Behar. Also, the trains worked over this 32 miles of single line during the busy traffic season were now so numerous that doubling could be postponed no longer. They had heard that day that the estimate for these schemes had been sanctioned by the Government of India. The sugar industry, with which their railway was intimately concerned, was now controlled by the Government in Behar and the United Provinces. Among other clauses the Control Act would, it was hoped, provide for the better organisation of cane supplies to mills by a system of zoning, and the marketing of sugar; measures which it was hoped would be advantageous to the industry and the railway also.

During the year notice was received that the Government of India had decided that the hours of employment regulations should be given statutory effect by the company as from October last. The annual cost of fulfilling the requirements of these regulations was 2¼ lakhs of rupees. To complete housing the additional staff, quarters costing Rs. 3¼ lakhs were being built.

The question of how to minimise ticketless travel was still a very serious one, and every effort was being made by means of travelling ticket collectors, better fencing at stations, and other means to reduce it as far as possible. During the last year 315,247 passengers were detected, or nearly 900 a day, a very serious matter involving just under 2 lakhs of rupees, although only about one per cent. of those travelling was involved.

The difficulty experienced in recruiting British officers, owing to the terms offered being insufficient to attract suitable men under present-day conditions of service and prospects in India, gave rise to anxiety. The Indianisation of their superior staff was proceeding, but to ensure the successful operation of the company's railway it was essential to maintain a sufficient leavening of British officers. This was now difficult to secure by reason of the inadequacy of the revised scales of pay introduced in 1932, when the drop in earnings caused by the great trade depression necessitated retrenchment. A memorandum had been sent to the Railway Board representing the inadequacy of the revised scales and that it was now necessary to revert to the company's old scales of pay for the superior staff. Staff welfare committees met regularly at all large railway centres and also at the workshops at Gorakhpur. A great

factor in the wellbeing of the staff was the medical department maintained by the railway, which, with its efficient staff and well-equipped hospitals, was a great influence tending to their contentment.

The report of the Wedgwood Committee presented during the last year to the Government of India with suggestions as to how to improve the working and finance of the State Railways hardly concerned their railway at all, and its only reference to it was to quote it in one case as an example of a railway economically managed. The report recommended several economies in working which had always been the practice on their line.

During the year provincial autonomy in accordance with the Government of India Act came into force, and provinces were now governed by a Ministry elected by and accountable to the popular vote. The Indian National Congress formed the majority party in the provinces with which they were concerned, Behar and the United Provinces. It was not to be expected that so great a transposition of the masses of India, from governed to governing, could happen without introducing unsettling conditions. Although strikes and disturbances unsettled mill and factory workmen in industrial centres such as Cawnpore, where the company had close business connections, the new Government had taken necessary measures for the maintenance of law and order and to afford support against anti-social and dangerous agitators. He was glad to say that the traffic prospects were satisfactory, though the political atmosphere was rather tense; however, it was expected that any setbacks which might be experienced would be of a temporary nature.

The Chairman concluded with an expression of their high appreciation of the excellent work of their staff in India and in their London office. They had performed their duties with zeal and efficiency and had come up to the high standard which they had learned to expect in them.

The Chairman then proposed: "That the report of the directors, dated January 15, 1938, together with the audited statement of accounts and balance sheets for the year ended September 30, 1937, be, and they are hereby received, approved and adopted."

Sir Leonard L. Cohen, K.C.V.O., seconded the motion, which was carried unanimously.

The Chairman next proposed: "That a final dividend of £7 per cent. and a bonus of £3 per cent. for the six months ended September 30, 1937, on the ordinary stock of the company, less income tax, be, and the same are hereby declared, making with the ad-interim dividend of £4 per cent. and a bonus of £4 per cent. paid on July 26, 1937, a total dividend of £18 per cent. for the year ended September, 1937."

The Rt. Hon. Lord Meston, K.C.S.I., seconded, and the motion was carried unanimously.

The next motion by the Chairman was that it was "Resolved that the directors be authorised to transfer from the existing contingency fund to the London staff contingency compensation fund when they deem necessary a further sum or sums not exceeding in the aggregate £6,000 to be at the disposal of the directors for the same purposes as the amount already standing to the credit of the last mentioned fund."

Miss I. F. P. Monckton seconded the motion, which was carried unanimously.

The re-election of Sir Leonard L. Cohen, K.C.V.O., as a Director of the company was moved by the Chairman, seconded by Lt.-Col. W. R. Izat, D.S.O., R.E., and carried unanimously.

The Chairman also moved the re-election of the Rt. Hon. Lord Meston, K.C.S.I., which, seconded by Sir Malcolm Hogg, was carried unanimously.

Mr. A. W. C. Addis having proposed "That Messrs. Cooper Bros. & Co. and Messrs. Gerard Van de Linde & Son be, and they are hereby re-elected auditors of the company for the ensuing year at a remuneration of 75 guineas, each, per annum," Mr. H. O. Clarke, seconded, and the motion was carried unanimously.

Miss I. F. P. Monckton, moving a vote of thanks to the Chairman, the directors and also to the Agent and staff in India and England for their services during the past year, paid a tribute to the high standing of the company.

Mr. R. Jackson seconded the vote of thanks, and the Chairman expressed the appreciation of himself and the board of the tribute.

Locomotive Rationalisation

Considerable interest was aroused when during last year the locomotive goodwill of the Armstrong Whitworth Securities Co. Ltd. was purchased by the Locomotive Manufacturers Association for £125,000. This interest has been renewed by the important development just announced, whereby the same body is acquiring the goodwill and assets of Nasmyth Wilson & Co. Ltd., one of the oldest and hitherto among the best-known firms in the British locomotive industry.

N.W. (Locomotives) Limited has been registered as a public company with a nominal capital of £200 in £1 shares, of which 100 are 4 per cent. cumulative preference shares, and a contract has been entered into for the purchase of the business for £70,000 to be satisfied by the allotment and issue of 100 ordinary shares of £1 each credited as fully paid. The directors are Messrs. F. S. Whalley and J. W. Vaughan.

At the annual meeting of Nasmyth Wilson & Co. Ltd., held in December last, the Chairman, Mr. Charles F. Spencer, referred to the hope that a fuller measure of rationalisation would shortly become effective in the locomotive industry, thus forecasting the development that has now taken place.

We understand that the firm is keeping its works open as a going concern and substantial orders for engineering products have already been received.

Forthcoming Events

Jan. 28 (*Fri.*).—Institute of Transport (Manchester-Liverpool), at Central Library, Manchester, 6.30 p.m. "Advertising Transport," by Mr. K. Brady.

Jan. 29 (*Sat.*).—Permanent Way Institution, at Inst. of Civil Engineers, Great George Street, London, S.W.1, 2.30 p.m. Winter Meeting. Annual Winter Dinner, at Charing Cross Station Hotel, 6.30 p.m.

Feb. 1 (*Tues.*).—Great Eastern Mechanics' Institution, Stratford, 8 p.m. "Mechanical Appliances of the London Fire Brigade," by Major C. Morris.

Institute of Transport (Leeds), at Hotel Metropole, 6.30 p.m. "This Transport Problem," by Mr. C. Le M. Gosselin.

Institute of Transport (Metropolitan Graduate), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "Railway Electrification," by Mr. H. Trickett.

Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. Joint Meeting with Société des Ingénieurs Civils de France (British) and Inst. of Structural Engineers. "Dunkerque Harbour Extension Work," by M. P. Brice.

Feb. 2 (*Wed.*).—Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. "The Resistance to Fatigue Stresses of Welded and Riveted Joints," by Prof. F. Lea.

Southern Railway Eastern Divisional Engineers' Department, at County Hotel, Ashford, 6.30 p.m. Staff Dinner.

Feb. 3 (*Thurs.*).—G.W.R. (London) Lecture and Debating Society, in General Meeting Room, Paddington Station, 5.45 p.m. "Port Management and Operations at Cardiff," by Mr. B. Carpenter.

Southern Railway (London) Lecture and Debating Society, at Chapter House, St. Thomas' Street, S.E.1, 5.45 p.m. "Light Railways and their Possibilities," by Mr. Charles F. Klapper.

Feb. 4 (*Fri.*).—Institute of Transport (Nottingham Graduate), at Guildhall, 7 p.m. "Some Aspects of Transport—Old and New," by Mr. G. Gray.

Omnibus Society, at Inst. of Marine Engineers, The Minories, London, E.C.3, 7 p.m. Paper by Mr. A. Mackenzie.

Feb. 17 (*Thurs.*).—Railway Club, at Royal Scottish Corporation Hall, Fetter Lane, London, E.C.4, 7.30 p.m. Annual General Meeting. "Railways in Law: Grains of Railway History Gleaned from the Law Reports," Presidential Address by Mr. Kenneth Brown.

Forthcoming Meetings

Feb. 2 (*Wed*).—**Forth Bridge Railway Company** (General) King's Cross Station, London, N.1, at 11·15 a.m.

Feb. 8 (*Tues.*)—**Whitechapel & Bow Railway Company** (Ordinary General), 55, Broadway, Westminster, S.W. 1, at 2.45 p.m.

NOTES AND NEWS

Studentship of the Institute of Transport.—The Council of the Institute of Transport has extended the list of examinations which it recognises as qualifying for admission to studentship, by the addition of the Board of Trade Examination for Second Mate.

Puerto Cabello Railway.—A scheme of arrangement between the Puerto Cabello & Valencia Railway Company and the holders of its coupon bonds to bearer extending the present moratorium for another three years was sanctioned by Mr. Justice Crossman in the Chancery Division on January 24.

Transfer of Swiss Agencies Abroad.—As from January 1, the Brussels, Stockholm, and Prague agencies of the Swiss National Tourist Office have been taken over by the Federal Railways, who now have 12 agencies in foreign countries, the others being London, Paris, Vienna, Milan, Rome, Cairo, and New York. The Stockholm and Prague agencies will be transferred to new and larger premises in the business centres of these cities.

Locomotive Naming Ceremony at Euston.—On Wednesday last, January 26, at Euston station, Mr. A. E. Heath, C.M.G., Agent General for New South Wales, named one of the latest L.M.S.R. locomotives *New South Wales*. A detachment and band of the Royal Navy took part in the ceremony in recognition of the fact that Captain Arthur Phillips, R.N., was in command of the brig *Supply*, from which was effected the first landing of settlers in Australia 150 years ago.

Railway Memorandum on "Staggered" Holidays.—The four mainline railway companies, which, as recorded in THE RAILWAY GAZETTE, of November 19, 1937, have already presented a statement to a Government Committee regarding the effect upon their operations of concentrated holiday traffic, have now prepared a memorandum on the subject of an extended holiday season. This will be circulated to Chambers of Commerce and over 1,000 trade associations, and to the universities and public libraries.

Erie Railroad Bankruptcy.—It now appears that the filing of a petition in bankruptcy by the Erie Railroad Company, as announced in our issue of January 21, was expected by those acquainted with the trend of events, as a natural consequence of the refusal of the Reconstruction Finance Corporation to provide further finance. The disinclination of the Chesapeake & Ohio Railroad, which controls the Erie, to guarantee a loan has brought matters to a head. Mr. Jesse Jones, President of the R.F.C., has expressed the opinion that the Chesapeake Company, in refusing to help the Erie, is simply endeavouring to force the latter into bankruptcy in order to secure reorganisation on more favourable terms. It is believed that the step now taken by the Erie Railroad Company will bring matters to a point where some compromise will be possible.

New 4-6-0 Express Locomotives, Bengal-Nagpur Railway.—We are informed that the Tecalemit grease guns and nipples used on these engines were supplied by Whitelegg & Rogers Limited and not direct by Tecalemit Limited, as stated in the list of sub-contractors on page 111 of last week's issue.

Buses on Waverley Station, Edinburgh ?—At a recent meeting of magistrates in Edinburgh, the Lord Provost, Mr. Louis S. Gumley, suggested that the roof of Waverley railway station, L.N.E.R., might be used for a bus station. The idea was remitted to the city engineer and the city architect to submit detailed reports on the scheme. Most of the buses working into Edinburgh are owned by the Edinburgh Corporation and by the railway-associated Scottish Motor Traction Co. Ltd.

Institution of Railway Signal Engineers.—At a meeting in London, on January 26, a paper on "Signalling Developments in New Zealand," by Mr. G. W. Wyles, Signal and Electrical Engineer, New Zealand Government Railways, was read on his behalf by Mr. Iva i Wyles. An abstract of the paper appears in this issue. In the discussion, the following spoke: W. S. Roberts (by communication), Mr. Powell, B. F. Wagenrieder, G. H. Crook, T. S. Lascelles, J. Boot, R. S. Proud, F. L. Castle, and the President, Mr. H. M. Proud. Some excellent lantern slides were shown. The annual general meeting and presidential address will be held in London, on February 23, at 6 p.m., at the Institution of Electrical Engineers.

The Railways of Mexico.—According to our American contemporary, the *Railway Age*, the Lineas Ferreas de Mexico S.A. de C.V. was completely liquidated on December 9 and all its properties turned over to the new autonomous Department of Railways of the Government of Mexico. This liquidation was begun on September 7, 1936, on which date all of its lines under construction were transferred to the Government. This corporation was formed two or three years ago to take over all projected lines, those which were not under actual construction and those which did not belong to the National System of Mexico. On December 10, by Presidential decree, the autonomous Department of Railways took over the National of Mexico and affiliated lines. Under the new organisation, the Department of Railways will be under the direct jurisdiction of the President of the Republic, and a tax of 10 per cent. of the gross revenue will accrue to the Government. In addition, all net earnings will be turned over to the Government, which will determine the amount to be used in additions and betterments. The remainder is to become the property of the nation, and to be used for the same general purpose as other taxes and Government income. The Lineas Ferreas de Mexico, a part of the new system, will lose its corporate identity at once and the National of Mexico will be liquidated as soon as final arrangements are made and a decision reached as to the amounts to be paid to the stockholders as compensation for the expropriation of the property.

Institute of Transport Annual Dinner.—The next annual dinner is to be held on Friday, March 4, at the Connaught Rooms, Great Queen Street, London, W.C.2, and will be followed by a dance. The provisional programme is as follows: Reception, 7.0 to 7.20 p.m.; dinner, 7.30 p.m.; dancing until 1.0 a.m. Tickets (price 18s. each, exclusive of wines, &c., but inclusive of waiters' gratuities and buffet refreshments during the dance) are to be obtained from the Secretary of the institute. It is requested that applications should be made early.

New London Transport Country Bus Routes.—The London Passenger Transport Board has acquired two services in the Guildford area from Blue Saloon Coaches. This brings the total number of country bus routes operated by London Transport to 201. These services, which have been numbered 415 and 438, began to run under London Transport auspices on Wednesday, January 12. Service 415 is Guildford and Ripley, and Service 438 Guildford and Woking *via* Burnham. On both routes a faster service is operated than heretofore.

Fiftieth Anniversary of Pneumatic Tyre Invention.—To celebrate the fiftieth anniversary of the invention of the pneumatic tyre by John Boyd Dunlop, the Dunlop Rubber Co. Ltd. has had produced a film entitled "Jubilee." The première of this film, which shows in graphic detail how the Dunlop pneumatic tyre came to be invented and the subsequent world-wide developments of that event, was given in the hall of the Royal Empire Society, London, on Monday last, January 24. Among those present was Mrs. McClintock, a daughter of J. B. Dunlop.

Rugby Locomotive Testing Station.—In accordance with the announcement made some months ago that the L.M.S.R. and L.N.E.R. had decided to construct a locomotive testing station as a joint undertaking, a superintending committee has now been formed (consisting of directors and officers of the two companies) in which general control of the station will be vested. Details of the elections and appointments to this committee appear in our Personal section on page 187. The design, construction, and management of the plant will be under the control of a management committee, consisting of the chief mechanical engineers of the two companies.

Collision near Bedford, L.M.S.R.

A collision occurred at about 3.0 p.m. on January 21 at Oakley junction, about two miles north of Bedford, L.M.S.R., when the 2.10 p.m. express, St. Pancras to Bradford, was diverted on to the Northampton branch where it collided head-on with a train of empty stock that was being shunted into a siding. Several coaches were telescoped and the two engines were locked together with their smokeboxes touching. They were 3-cylinder 4-6-0 No. 5568, *Western Australia*, hauling the express, and 2-cylinder 2-6-0 mixed traffic No. 2893 on the empty train. The down fast line and both lines on the Northampton branch were blocked, but the down fast line was cleared at 5 p.m. Two passengers lost their lives and 17 were injured. One of the former was Mr. Charles Allensby, President of the Institution of Heating and Ventilating Engineers, who died in hospital. He was on his way to the annual dinner of the institution at Nottingham in company with the General Secretary, Mr. C. C. Ferguson, who was injured.

On learning of the circumstances the members abandoned the function after the loyal toast.

Lt.-Col. E. Woodhouse will conduct the official inquiry.

BRITISH NARROW GAUGE RAILWAYS.—At the monthly meeting of the Railway Club, on January 13, Mr. L. T. Catchpole gave an exhibition of cinema films taking for his subject "British Narrow-Gauge Railways." First, a film of the Festiniog Railway was shown; this line in spite of its small gauge of 1 ft. 11½ in., was successful owing to peculiar natural advantages in favour of the extensive slate traffic. A slide illustrated graphically the growth and decline of narrow-gauge railways in Great Britain, and a short description of each was given. A film of the Isle of Man Railway was then shown, illustrating how a 3-ft. gauge line can be a practical proposition for a complete railway system. The third film depicted the ill-fated Lynton & Barnstaple Railway.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 3rd Week			Totals to Date		
	1938	1937	Inc. or Dec.	1938	1937	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,856 mls.)						
Passenger-train traffic	385,000	359,000	+ 26,000	1,145,000	1,090,000	+ 55,000
Merchandise, &c.	488,000	470,000	+ 18,000	1,421,000	1,395,000	+ 26,000
Coal and coke	318,000	277,000	+ 41,000	938,000	835,000	+ 103,000
Goods-train traffic	806,000	747,000	+ 59,000	2,359,000	2,230,000	+ 129,000
Total receipts	1,191,000	1,106,000	+ 85,000	3,504,000	3,320,000	+ 184,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic	258,000	242,000	+ 16,000	773,000	740,000	+ 33,000
Merchandise, &c.	333,000	323,000	+ 10,000	961,000	955,000	+ 6,000
Coal and coke	304,000	267,000	+ 37,000	849,000	774,000	+ 75,000
Goods-train traffic	637,000	590,000	+ 47,000	1,810,000	1,729,000	+ 81,000
Total receipts	895,000	832,000	+ 63,000	2,583,000	2,469,000	+ 114,000
G.W.R. (3,739½ mls.)						
Passenger-train traffic	159,000	152,000	+ 7,000	488,000	486,000	+ 2,000
Merchandise, &c.	198,000	182,000	+ 16,000	581,000	549,000	+ 32,000
Coal and coke	130,000	118,000	+ 12,000	382,000	356,000	+ 26,000
Goods-train traffic	328,000	300,000	+ 28,000	963,000	905,000	+ 58,000
Total receipts	487,000	452,000	+ 35,000	1,451,000	1,391,000	+ 60,000
S.R. (2,147 mls.)						
Passenger-train traffic	260,000	247,000	+ 13,000	783,000	754,000	+ 29,000
Merchandise, &c.	59,000	57,000	+ 2,000	165,500	167,500	− 2,000
Coal and coke	40,000	36,000	+ 4,000	109,500	102,500	+ 7,000
Goods-train traffic	99,000	93,000	+ 6,000	275,000	270,000	+ 5,000
Total receipts	359,000	340,000	+ 19,000	1,058,000	1,024,000	+ 34,000
Liverpool Overhead (6½ mls.)	1,411	1,175	+ 236	4,253	3,666	+ 587
Mersey (4⅜ mls.)	4,421	4,119	+ 302	13,770	13,260	+ 510
*London Passenger Transport Board	560,100	549,200	+ 10,900	16,857,800	16,800,200	+ 57,600
IRELAND.						
Belfast & C.D. pass. (80 mls.)	1,689	1,605	+ 84	5,222	4,901	+ 321
,, ,, goods	377	390	− 13	1,154	1,228	− 74
,, ,, total	2,066	1,995	+ 71	6,376	6,129	+ 247
Great Northern pass. (543 mls.)	7,500	6,700	+ 800	24,300	22,200	+ 2,100
,, ,, goods	8,450	8,550	− 100	23,050	24,650	− 1,600
,, ,, total	15,950	15,250	+ 700	47,350	46,850	+ 500
Great Southern pass. (2,076 mls.)	26,849	24,964	+ 1,885	84,627	80,373	+ 4,254
,, ,, goods	37,979	43,022	− 5,043	133,960	137,728	− 3,768
,, ,, total	64,828	67,986	− 3,158	218,587	218,101	+ 486

* 30th week (before pooling)

British and Irish Railway Stocks and Shares

Stocks	Highest 1937	Lowest 1937	Prices Jan. 26, 1938	Prices Rise/Fall
G.W.R.				
Cons. Ord.	67⅜	55¾	63	+1½
5% Con. Prefce.	127	108	117½	—
5% Red. Pref. (1950)	113	109	110½	—
4% Deb.	113⅝	102½	109½	—
4½% Deb.	118	106	110½	—
4½% Deb.	124½	112	117½	—
5% Deb.	136½	122¾	129½	—
2½% Deb.	76	64	68½	—
5% Rt. Charge	133 7/16	118	127	+½
5% Cons. Guar.	133¾	116½	127	—
L.M.S.R.				
Ord.	36⅛	25⅜	28¼	+¾
4% Prefce. (1923)	82½	65¾	68	+1
4% Prefce.	92½	77¾	79½	−½
5% Red. Pref. (1955)	107¾	102	103	—
4% Deb.	108	99¼	104½	—
5% Red. Deb. (1952)	117½	111	113½	—
4% Guar.	104	95⅞	102	—
L.N.E.R.				
5% Pref. Ord.	12½	6¾	8	—
Def. Ord.	6¼	3⅝	4	—
4% First Prefce.	79½	63	65½	—
4% Second Prefce.	31½	21	25½	+½
5% Red. Pref. (1955)	101¼	89¾	96½	—
4% First Guar.	103	91⅞	95½*	—
4% Second Guar.	97⅝	85½	89*	—
3% Deb.	84⅛	74	78½	−½
4% Deb.	107¼	98½	103½	—
5% Red. Deb. (1947)	113½	106½	110½	—
4½% Sinking Fund Red. Deb.	110 5/16	105½	107	—
SOUTHERN				
Pref. Ord.	98⅝	83½	84	+½
Def. Ord.	27⅞	16¾	19½	+¾
5% Pref.	126 1/16	105 15/16	114½	—
5% Red. Pref. (1964)	118	110¼	113½	—
5% Guar. Prefce.	133¾	116¾	127	—
5% Red. Guar. Pref. (1957)	118½	111½	115	—
4% Deb.	112	101¼	108	—
5% Deb.	135¾	123½	127½	—
4% Red. Deb. 1962–67	113	105	106½	—
BELFAST & C.D.				
Ord.	5	4	4½	—
FORTH BRIDGE				
4% Deb.	106	99½	100½	—
4% Guar.	105¾	99	100½	—
G. NORTHERN (IRELAND)				
Ord.	11	5	5½	—
G. SOUTHERN (IRELAND)				
Ord.	50	21½	22¾	—
Prefce.	61	34	33	—
Guar.	94¾	69½	67½	+½
Deb.	95	82⅛	82¾	+¼
L.P.T.B.				
4½% "A"	123¾	110½	118½	—
5% "A"	135	121½	128½	—
4½% "T.F.A."	108¾	104	106	—
5% "B"	125	114½	120½	—
"C"	99¾	75	80	+½
MERSEY				
Ord.	42⅝	22	20½	—
4% Perp. Deb.	103	96¾	100*	—
3% Perp. Deb.	77⅝	74½	74½*	—
3% Perp. Prefce.	68¾	61¼	65½	+1

* ex. dividend

CONTRACTS AND TENDERS

The London Passenger Transport Board has divided between Brecknell, Munro & Rodgers (1928) Limited and the Westinghouse Ticket Machine Co. Ltd. the largest order so far placed by the board for ticket-selling equipment, totalling in value £125,000 and covering the supply of 300 electrically worked slot ticket and change machines for installation in the Central London area. Ticket office equipment for Central London area stations will also be improved by the installation of 135 larger capacity printers.

J. Baker & Bessemer Limited has received an order from the Bengal-Nagpur Railway Administration for 1,000 steel carriage and wagon tyres.

The American Car & Foundry Export Company has received an order from the Entre Rios Railways for 350 chilled cast-iron wheels, 33-in. dia. on tread.

Stewarts and Lloyds Limited has received an order from the Indian Stores Department for the supply of a quantity of 10-in. steel piping at a total price of Rs. 11,293.

The Crown Agents for the Colonies have recently placed the following orders :—

Chloride Electrical Storage Co. Ltd., Accumulator spares.
Ingersoll-Rand Co. Ltd., Air compressors.
C. Richards & Sons Limited, Bolts, nuts, and standard studs.
The Whitecross Co. Ltd., Bronze and copper wire.
Callender's Cable & Construction Co. Ltd., Cable.
W. T. Henley's Telegraph Works Co. Ltd., Composite cable.
British Insulated Cables Limited, Copperweld wire and dry core cables.
F. Smith & Co., Copper wire.
J. Wilkes, Sons & Mapplebeck Limited, Copper wire.
Asiatic Petroleum Co. Ltd., Crude oil.
C. C. Wakefield & Co. Ltd., Cylinder oil.
Evans Lifts Limited, Electric lift.
J. Cranmer & Co., Expanded metal.
F. Braby & Co. Ltd., Galvanised corrugated sheets.
Manganese Bronze & Brass Co. Ltd., Gunmetal.
J. W. Roberts Limited, Locomotive asbestos mattresses.
Beyer, Peacock & Co. Ltd., Locomotive spares.
Vulcan Foundry Limited, Locomotive spares.
Kitson & Co. Ltd., Locomotive spares.
Howell & Co. Ltd., Steel tubes.
Dorman, Long & Co. Ltd., Mild steel angles.
Whitehead Iron & Steel Co. Ltd., Mild steel bars, and round mild steel.
Newport & South Wales Tube Co. Ltd., Pipes, specials, and steel poles.
Stewarts and Lloyds Limited, Pipes, bends, and steel poles.
Staveley Coal & Iron Co. Ltd., Pipes.
Pulsometer Engineering Co. Ltd., Pulsometer pump.
United Steel Cos. Ltd., Rails and fishplates.
Ruston & Hornsby Limited, Boilers.
Steel, Peech & Tozer, Spring steel.
Wolverhampton Corrugated Iron Co. Ltd., Steel sheets.
Cleveland Bridge & Engineering Co. Ltd., Steelwork for carriage lifting depot.
Crompton Parkinson Limited, Substation switchgear.
General Electric Co. Ltd., Telephone materials.
V. & R. Blakemore, Tools.
Bullers Limited, Tubular arms.
J. Spencer Limited, Tubular arms.
Westinghouse Brake & Signal Co. Ltd., Brake spares.
Dunlop Rubber Co. Ltd., Wheels and tyres.
J. Stone & Co. Ltd., White metal.

R. Y. Pickering & Co. Ltd. has received an order from the Bengal-Nagpur Railway Administration for 800 drawbars.

Taylor Brothers & Co. Ltd. has received an order from the Entre Rios Railways for 28 steel locomotive axles and 150 steel locomotive tyres.

The Yorkshire Engine Co. Ltd. has received an order from the Egyptian Delta Light Railways, to the inspection of Messrs. Rendel, Palmer & Tritton, for 12 firebox shells.

Edgar Allen & Co. Ltd. has received orders from the Egyptian State Railways Administration for die blocks. (Ref. No. E.S.R. 7.152. Total cost £378. Delivery f.o.b. English port.)

Klockner Eisen A.G. has received orders from the Egyptian State Railways Administration for the supply of mild steel bars. (Ref. No. E.S.R. 1.394. Total value £1,475. Delivery Quay, Gabbary.)

H. J. Skelton & Co. Ltd. has received orders from the Egyptian State Railways Administration for galvanised plain sheets. (Ref. No. E.S.R. 1.397. Total cost £648. Delivery f.o.b. Antwerp.)

Brown Bayley's Steel Works Limited has received an order from the Egyptian Delta Light Railways, to the inspection of Messrs. Rendel, Palmer & Tritton, for 86 locomotive tyres.

Brown Bayley's Steel Works Limited has also received an order from the Bengal-Nagpur Railway Administration for 800 steel carriage and wagon tyres.

U.S.S.R. Orders Placed in Great Britain

According to preliminary figures at present available, orders placed in the United Kingdom by Soviet trading organisations in the first 11 months of 1937 amounted to £18,872,841, as compared with £9,832,859 in the corresponding period of 1936, an increase of more than 90 per cent. The following table shows the principal orders placed for engineering and allied materials and the articles purchased in the period under consideration :—

	Nov., 1936	Nov., 1937
	£	£
Machinery and equipment	188,499	23,884
Ferro-alloys and steel...	10,497	1,647
Non-ferrous ores ...	—	—
Non-ferrous metals ...	297,217	156,277
Rubber	294,227	3,071
	Jan.-Nov., 1936	Jan.-Nov., 1937
	£	£
Machinery and equipment	535,725	7,979,441
Ferro-alloys and steel...	561,433	36,211
Non-ferrous ores ...	—	225,849
Non-ferrous metals ...	3,220,294	5,298,959
Rubber	2,141,690	2,000,902

Orders placed for machinery increased more than 15-fold as compared with 1936. There was a large increase in the purchase of non-ferrous metals. Ferro-alloys, steel, and rubber showed decreases.

Walker Brothers (Wigan) Limited has received an order from the Peruvian Corporation for one diesel railbus, fitted with Walker power bogie and 6 LW. Gardner diesel engines.

The Crown Agents for the Colonies have placed an order with Kitson & Co. Ltd. for three HGS-class superheated locomotive boilers for the Iraq State Railway.

The Birmingham Railway Carriage & Wagon Co. Ltd. has received an order from the Crown Agents for the Colonies for four six-ton bogie guard's brake vans, required for the Gold Coast Government Railway.

The Blaenavon Co. Ltd. has received an order from the Bengal-Nagpur Railway Administration for 730 steel carriage and wagon tyres.

Leyland Motors Limited has received orders from W. Alexander & Sons Ltd. for 50 oil-engined Tiger passenger vehicles, and from Ribble Motor Services Limited for six Tiger passenger vehicles.

Tenders are invited by the Bombay, Baroda & Central India Railway, receivable by February 18, at the White Mansion, 91, Petty France, Westminster, S.W.1, for the supply of one boiler for XC type locomotives.

Tenders are invited by the North Western Railway of India, receivable by the Agent, Lahore, by March 15, for the supply of 69,200 broad-gauge steel sleepers.

Tenders are invited by the Egyptian State Railways Administration, receivable at the Superintendent of Stores' Office, Saptieh, Cairo, by February 17, for the supply of 235 carriage and wagon tyres 3 ft. $2\frac{3}{4}$ in. dia.

Tenders are invited by the Egyptian State Railways Administration, receivable at the General Management, Cairo station, by February 16, for the supply of 29,800 kg. round copper bars.

Tenders are invited by the Egyptian State Railways Administration, receivable at the office of the Stores Department, Saptieh, Cairo, by March 1, for the supply of 67,000 kg. mild steel plates.

Tenders are invited by the Egyptian State Railways Administration, receivable at the General Management, Cairo station, by February 26, for the supply of one automatic electric butt-welding machine, five heavy-duty shaping machines and four centre lathes. Tenders are also invited, receivable by March 10, for the supply of five surfacing-and-boring lathes, 36-in. dia. swing, complete with electric motors and starters.

Tenders are invited by the Assam-Bengal Railway, receivable by February 16 at 56, Victoria Street, S.W.1, for the supply of 23 metre-gauge four-wheeled underframes, I.R.S. MC type, for covered goods wagons, complete with wheels and axles, and fitted with combined vacuum and hand brakes.

OFFICIAL NOTICES

Railway Research

At the meeting of the G.W.R. (London) Lecturing & Debating Society on January 20, presided over by Mr. C. R. Dashwood, Assistant General Manager, the winning entry in the prize essay competition on the subject "The Case for a Research Department in Railway Business," was read by Mr. S. C. Harvey (General Manager's Office), and discussed.

Mr. Harvey said that although it was true to say that modern industry and transport had been built up on research of one kind or another, the higher stage of development today made more systematic and co-ordinated research essential to further advance. The first broad outlines had already been filled in and the problems today were more difficult and refined. The kind of research which was most directly relevant to railways was enquiry into the practicability of using existing materials, and knowledge provided by purely scientific research.

A good beginning for such enquiry by a research department would be to investigate the possibilities of increasing still further the efficiency of the locomotive by, for instance, increasing the boiler pressure or making use of new steel alloys. Further research into the construction of lighter passenger and goods rolling stock would be likely to have even more fruitful results. Every railwayman was aware of the great benefit which this would have on the handling of passenger traffic at peak periods, by reducing the number of necessary trains and the occupation of the running lines. Similar considerations strengthened the case for research into reducing the tare weight of goods vehicles. On the organisation side, investigation of the extent to which repairs to both locomotives and rolling stock could be further rationalised would be remunerative. In regard to civil engineering there were also considerable possibilities, in, for instance, the field of lengthening the life of the permanent way.

In the operating and commercial departments there were many problems of great importance to their efficiency which would well justify the establishment of the research organisation. One of the most outstanding was the timetable, which had been built up piecemeal as alterations had been made in response to fluctuations in demand, and this applied particularly to the suburban services. Here research should be conducted on the assumption, of which the value had been empirically established, that traffic was created by frequency and regularity of services. A careful enquiry would have to be made in selected areas into, say, the potential demand for railway transport and competitive satisfactions to the consumer. This sort of method might clearly be also applied with advantage in the industrial sphere. In some areas there were great possibilities of creating demand for railway transport by assisting in the industrial development which would bring that demand. If argument was needed in favour of this kind of activity, it was supplied by the success which had already attended the efforts on these lines in South Wales. There should be no need to emphasise that the railways should conduct the most careful research based on the fact that their prosperity was inseparable from that of the territory which they served.

Two other ever-present problems which a research department could go far to solve, although much thought had already been devoted to them, were wagon distribution and the prevention of claims. With regard to the former, unless it could be said that the available supply of wagons was being used to the utmost possible degree, and few people would deny the difficulties in meeting the demands for wagons by traders at times of high pressure, it was evident that investigation could be made with advantage into the factors affecting the supply of wagons, such as the cause of delays and the turn-round at stations. Claims prevention was also a complicated problem, which would have to be approached by the research organisation in several ways. It would involve the use of a psychological technique in regard to the staff; correlated with this, there would have to be an attempt to improve the equipment with which the staff had to deal, the packing cases and wagon fitments to minimise shock. Successful research in both these matters would undoubtedly improve relations between the railways and the trading interests as well as reduce costs. The necessity of reducing costs and of economic administration was also *prima facie* grounds for bringing within range of the research department the purchasing of stores and use of old material, which railway companies were bound to conduct on such a large scale.

What the lecturer wished to emphasise was the need for co-ordinated research under the sole control of a department created for that purpose, instead of the limited and discreet research being carried out today. In view of the expenditure which this would involve for one company it might be necessary to extend the idea to a central research office for all railway companies, since many of the problems with which it would deal were common to all of them. There were many such problems; but there were also problems, such as suburban services arising out of each company's practice, which could be referred to smaller research bodies closely in touch with the central one but working under the direction of the appropriate company.

NEW FRENCH MINERAL RAILWAYS IN NORTH AFRICA.—According to a Reuters message, a 75-km. railway has just been completed from the iron mine at Sidi-Marouf in Algeria to the seaport of Jijeli. Another mineral line, 24 km. in length, has just begun to carry ore from the Ait-Aimar mine in Morocco to the main line. It is at present worked by steam, but is soon to be converted to electric traction. The present daily output is 1,000 tons of hematite with a 48 per cent. iron content.

Railway Share Market

Very inactive conditions have continued to rule in all sections of the Stock Exchange, with the exception of British Government securities. Debentures and prior charge issues of the home railways were again firm in sympathy with the latter, but on balance the junior stocks were reactionary, despite the excellent traffic figures for the past week. The lower prices of the junior stock are a reflection of the general trend of markets and do not indicate any further reduction of hopes regarding the impending dividend announcements. On the basis of the dividend estimates current in the market, reference to which has been made on a previous occasion, quite favourable yields are offered, and, if traffic receipts continue to make as good a showing as last week, when there was an aggregate increase of £202,000, higher prices would apparently be justified, granted a movement to better general market conditions.

L.M.S.R. ordinary was firmer around 28½ following news of last week's traffic gain of £85,000, but the 4 per cent. preference and 1923 preference stocks were dull at 79½ and 67 respectively. Great Western provided a relatively good feature with a recovery from 62⅛ to 63 on Wednesday; the rise of £35,000 in the past week's receipts was in excess of expectations and has tended to increase hopes of a raising of the dividend to 3½ per cent. The L.N.E.R. traffic increase of £63,000 was also considered to be good, but the second preference stock failed to respond and has been dull at 25½ on the suggestion that the payment for the past year may not exceed 1 per cent. Nevertheless, as in the case of the other main line railways, the dividend decision will turn very largely on the rise in expenses in the second half of 1937, and, as was shown by the statements for the first half of that year, the increased costs may be a good deal higher in some cases than in others. Southern preferred was lower at 84, despite the large yield offered and the reasonable expectation that the 5 per cent. dividend will continue to be earned so long as there is no material change in general trade conditions. Southern deferred had a steadier appearance at 19¼, under the influence of the £19,000 improvement in the past week's receipts. London Transport "C" remained firm, awaiting the interim dividend announcement.

Foreign railway stocks have again moved against holders in the absence of improved demand. The debentures of the leading Argentine companies were also lower, although there seems little justification for this. Nevertheless, it seems doubtful if there will be satisfactory recovery in prices pending a return of better general market conditions. Leopoldina 4 per cent. debentures were fractionally better at 17½. Canadian Pacific ordinary fluctuated moderately around 7¼.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1937-38	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1937	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1937	Prices: Lowest 1937	Prices: Jan. 26, 1938	Yield % (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	23.1.38	17,370	+ 470	4	55,340	50,610	+ 4,730	Ord. Stk.	23	10¼	13	Nil
	Argentine North Eastern	753	22.1.38	8,387	+ 1,210	30	285,945	270,557	+ 15,388	,,	19¼	8	5½	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	93½	60	80	5
	Bolivar	174	Dec., 1937	3,900	— 1,700	52	59,550	74,200	— 14,650	6 p.c. Deb.	9½	5	8½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	17	9	10½	4¾
	Buenos Ayres & Pacific	2,806	22.1.38	99,442	— 10,856	30	2,416,008	2,440,489	— 24,481	Ord. Stk.	17⅛	5½	6	Nil
	Buenos Ayres Central	190	8.1.38	$104,300	— $48,500	28	$3,526,100	$3,956,100	— $430,300	Mt. Deb.	41½	18	17½	Nil
	Buenos Ayres Gt. Southern	5,084	22.1.38	216,191	— 12,903	30	4,012,034	3,809,509	+ 202,525	Ord. Stk.	33¾	13½	15	Nil
	Buenos Ayres Western	1,930	22.1.38	50,806	— 14,765	30	1,336,378	1,358,205	+ 8,173	,,	31¾	11¼	11½	Nil
	Central Argentine	3,700	22.1.38	121,751	— 64,857	30	3,787,309	4,315,167	— 527,858	,,	34¼	10¾	11½	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	20½	4½	6	Nil
	Cent. Uruguay of M. Video	980	15.1.38	19,329	— 502	29	489,665	485,882	+ 3,783	Ord. Stk.	67/32	2	2½	Nil
	Cordoba Central	1,218	22.1.38	24,880	— 5,700	30	895,380	973,560	— 78,180	Ord. Inc.	6¼	1½	1½	Nil
	Costa Rica	188	Nov., 1937	22,336	+ 2,744	22	123,362	91,581	+ 31,781	Stk.	38	27	28½	7
	Dorada	70	Nov., 1937	15,800	+ 1,000	48	170,100	156,500	+ 13,600	1 Mt. Db.	107	106	107½	59/16
	Entre Rios	810	22.1.38	18,548	+ 3,486	30	426,634	391,785	+ 34,849	Ord. Stk.	19⅞/16	6	5	Nil
	Great Western of Brazil	1,092	22.1.38	10,700	+ 600	4	31,100	32,600	— 1,500	Ord. Sh.	5/4	1/8	5/8	Nil
	International of Cl. Amer.	794	Nov., 1937	$509,126	+ $82,245	48	$5,379,250	$4,650,651	+ $728,599	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	2/-	1/-	1/2	Nil
	La Guaira & Caracas	22½	Dec., 1937	4,890	— 1,335	52	61,575	56,700	+ 4,875	Stk.	8½	6	8½	Nil
	Leopoldina	1,918	22.1.38	19,588	— 1,987	4	59,530	67,731	— 8,201	Ord. Stk.	9¼	3	3½	Nil
	Mexican	483	21.1.38	$282,700	— $7,900	3	$738,000	$856,500	— $118,500	,,	1½	1/4	1/2	Nil
	Midland of Uruguay	319	Dec., 1937	9,910	+ 1,003	26	52,414	50,223	+ 2,191	,,	1⅞	1/2	1/2	Nil
	Nitrate	384	15.1.38	6,676	— 5	2	6,776	6,781	— 5	Ord. Sh.	3¹⁄₁₆	2	2⁵⁄₁₆	Nil
	Paraguay Central	274	15.1.38	$2,807,000	— $495,000	29	$92,947,000	$75,639,000	+ $17,308,000	Pr. Li. Stk.	84	79¼	77½	7¾
	Peruvian Corporation	1,059	Dec., 1937	76,908	— 4,604	26	504,036	490,785	+ 13,251	Pref.	14⅝	4½	5	Nil
	Salvador	100	15.1.38	¢37,750	— ¢7,500	29	¢455,125	¢462,758	— ¢7,633	Pr. Li. Db.	23½	21½	22½	Nil
	San Paulo	153½	16.1.38	30,825	+ 2,080	3	63,248	65,240	— 1,992	Ord. Stk.	98½	56	53½	9⅝
	Taltal	160	Dec., 1937	6,185	+ 2,095	26	22,535	20,900	+ 1,635	Ord. Sh.	1⁷⁄₁₆	1¹¹⁄₁₆	5/4	13⁹⁄₁₆
	United of Havana	1,353	22.1.38	22,800	— 449	30	505,506	486,333	+ 19,173	Ord. Stk.	5⅝	5¹³⁄₃₂	2	Nil
	Uruguay Northern	73	Dec., 1937	991	— 519	26	5,294	6,564	— 1,270	Deb. Stk.	10	2	3½	Nil
Canada	Canadian National	23,803	21.1.38	631,460	— 27,610	3	1,788,896	1,891,991	— 103,095	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	77	62½	69½	5⅝
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	101⅞	94½	100	4
	Canadian Pacific	17,186	21.1.38	474,800	+ 600	3	1,404,600	1,388,400	+ 16,200	Ord. Stk.	18	7¼	7½	Nil
India†	Assam Bengal	1,329	31.12.37	42,817	— 164	39	1,023,332	984,581	+ 38,751	Ord. Stk.	86	73½	81	31¹¹⁄₁₆
	Barsi Light	202	31.12.37	5,940	+ 2,295	39	100,327	87,165	+ 13,162	Ord. Sh.	66½	46	57	8⅝
	Bengal & North Western	2,107	10.1.38	75,225	— 6,774	14	757,959	775,913	— 17,954	Ord. Stk.	317	301	308	5¹³⁄₁₆
	Bengal Dooars & Extension	161	31.12.37	4,237	+ 211	39	112,887	101,594	+ 11,293	,,	100	84	86½	7
	Bengal-Nagpur	3,268	31.12.37	213,900	+ 60,100	39	5,146,024	4,518,097	+ 627,927	,,	101	89	90½	4⁷⁄₁₆
	Bombay, Baroda & Cl. India	3,072	20.1.38	262,500	— 47,250	43	7,044,000	6,899,925	+ 144,075	,,	113	110½	111½	5⅜
	Madras & Southern Mahratta	3,229	31.12.37	183,975	— 28,336	39	4,109,159	4,118,779	— 9,620	,,	110	105	107½	7¹⁵⁄₁₆
	Rohilkund & Kumaon	571	10.1.38	16,413	— 566	14	135,309	141,430	— 6,121	,,	314	302	308	5¹⁵⁄₁₆
	South Indian	2,531½	31.12.37	146,038	+ 14,932	39	3,136,691	3,011,165	+ 125,526	,,	103½	99½	100½	4¾
Various	Beira-Umtali	204	Nov., 1937	90,637	+ 21,848	9	186,351	137,294	+ 49,057	—	—	—	—	—
	Egyptian Delta	620	10.12.37	7,900	— 311	36	183,881	174,138	+ 9,743	Prf. Sh.	31/-	5/4	11/4	Nil
	Great Southern of Spain	—	—	—	—	—	—	—	—	Inc. Deb.	3½	1/3	3½	Nil
	Kenya & Uganda	1,625	Dec., 1937	195,953	— 9,301	52	2,710,000	2,527,158	+ 182,842	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	48⅛	43½	45½	8⅝
	Midland of W. Australia	277	Nov., 1937	14,455	+ 1,259	22	69,130	67,251	+ 1,879	Inc. Deb.	98	93½	93½	4¼
	Nigerian	1,900	11.12.37	70,119	— 9,151	37	1,884,489	1,508,333	+ 376,156	—	—	—	—	—
	Rhodesia	2,451	Nov., 1937	428,233	+ 94,574	9	895,596	688,890	+ 206,706	—	—	—	—	—
	South Africa	13,263	1.1.38	547,259	— 17,523	40	25,597,482	24,165,582	+ 1,431,900	—	—	—	—	—
	Victoria	4,774	June, 1937	793,223	+ 89,530	52	10,135,291	9,689,925	+ 445,366	—	—	—	—	—
	Zafra & Huelva	112	Sept., 1937	15,307	+ 8,641	39	117,046	65,948	+ 51,098	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16.

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value.